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July 1984: \$1.50

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# BITS & BYTES

July 1984 Vol. 2 No 10 ISSN 0111-9826

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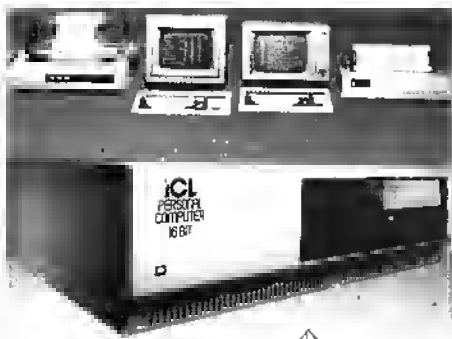
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# Computers in Schools

By Paul Crooks

New Zealand schools came within a few weeks of being granted more than \$10M in government money for the purchase of computers in 1981.

This information has been conveyed to *Bits & Bytes* by sources very close to the events that occurred in 1981, including Mr John Lovelock, managing director of Microprocessor Developments Ltd and several of Progeni Ltd's top management.

In August 1981, the Minister of Education, Mr Wellington, intended to ask the Cabinet for more than \$10M in government money to provide computers in New Zealand schools.

The computer introduced would have been the New Zealand developed and built Poly computer, jointly owned by the Development Finance Corporation, a Government body and the private company, Progeni.

For Mr Wellington, it would have been a significant coup in an election year (1981); he would have been seen as the person to introduce computers into New Zealand schools.

However, his plan was challenged by a group of private computer companies joined together in an organisation called the Microcomputer Industry Association.

Faced with arguments from both sides Mr Wellington then decided against taking his proposal to Cabinet.

Instead, his department requested information from computer companies, which resulted in five computer brands being recommended to schools but no finance provided for schools to purchase these computers.

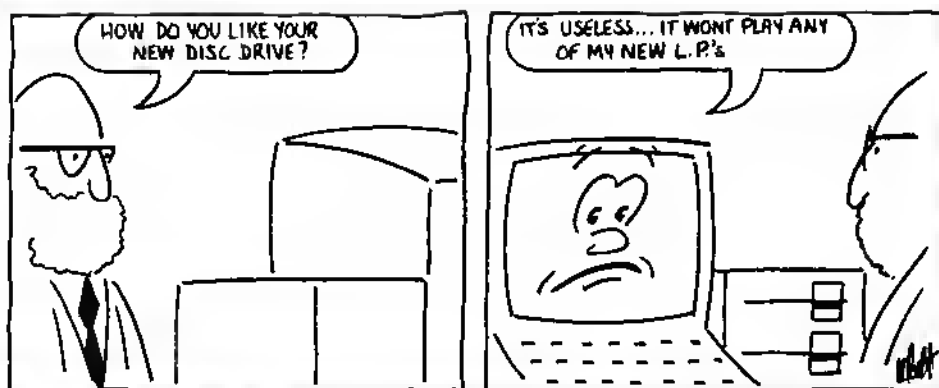
(The complete text of this report was finally released last month after a number of requests from interested parties and an in-depth look at the report appeared in last month's issue of *Bits & Bytes*.)

Today, more than a dozen computer brands are unevenly represented in New Zealand schools with little or no software compatibility.

In this issue we include (starting on page 24) detailed statements by the two main parties involved in the events that took place: Mr John Lovelock of MDL (also chairman of the Microcomputer Industry Association) and Mr Dick Greenbank of Polycorp, which is wholly owned by Progeni Ltd.

## MICRO MOMENTS

BY MATT KILLIP



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# Software trading

A trading table is now available for Poly users. It will enable them to obtain free programs, and share, trade, or sell programs.

Institutions using Poly computers are vastly different in their function and often widely separated. It is hoped the Poly Trading Table will not only serve to share program efforts and ideas, but will open up communications between students and staff who have the Poly computer as a common interest.

The table is being run with the co-operation of the computer studies department at Wellington Teachers' College.

A list of the programs available will be carried in each issue of Polytalk, the Poly users sharing group newsletter. The newsletter will be published at least every other month.

Among the 30 Trading Table programs listed in the May issue, for example, were free programs covering tables practice, an annual budget and cash flow for farmers, scaling and ranking of marks, reading comprehension testing, bar graph reading, a Royal family tree and various other utilities, games and graphics programs. An accrediting database is available for sale or trade.

As Poly users contribute programs for sharing, the list will be expanded.

There are more than two dozen Poly educational users throughout the country. Further details can be obtained from:

Poly Trading Table,  
C/- Christine Greenbank,  
Computer Studies,  
Wellington Teachers College,  
Private Bag,  
Karori, Wellington.

## Bible software

A computerised version of the Bible has been introduced. Called The WORD Processor, it has the complete text of the King James version on diskettes to allow on-line searching of words, phrases, and whole verses. It allows the creation of indices for study and sells in Australia for \$Aust395. Produced by Bible Research Systems, of the United States, the Australasian agent is Datacare, of P.O. Box 50, Yeronga, Queensland, 4104. Datacare specialises in software packages for churches. The WORD Processor runs on the IBM PC and Xt, the Columbia, any 8088-based micro, Apple IIe, II plus and III, the Franklin, the Kaypro, the Osborne, the TRS80 Model II (running CP/M) and a few other machines. Datacare is also the agent for the Adam II

# News from Britain

A logical if sudden development in Britain has reputedly seen Acorn Computers (of educational and home computer fame) engaged in a take-over with Torch Computers (of business fame). Although it is unclear just what the financial details of the deal are, the result is to produce a single company with a broad range of compatible products. The Torch range uses a BBC computer mother board as an input/output processor.

Apart from getting a heavy leg into the business market and viewdata systems, Acorn also gains access to several highly strategic components compatible with its BBC range.

Among these are Z-80 second processors, the twin-disk Torchpack and a Z-80-based alternative to the

Church information management system in dBase II. It has modules for membership (can handle up to 65,000 members and visitors), and other aspects of church management. This package is from Omega Information Systems of the United States.

## C64 FORTH

The language, FORTH, is now available for the Commodore 64 on a cartridge at \$99.95 retail. FORTH 64 features in eractive structured programming, virtual memory, allowing very large programs, compact, fast compiled mode, the ability to work in any numeric base, text editor and macro assembler, and the ability to have all or part of a program coded in assembler.

## AT&T and ICL

American Telephone and Telegraph, the world's biggest company, which had a virtual monopoly on the American telephone system recently broken up, shows increasing signs of flexing its muscles in the computer world. It already has much experience of computers in telephone exchanges, telecommunications systems, and for other special purposes, but was previously barred from expanding in the field by the anti-trust legislation. Its latest move is an agreement with ICL to co-operate with the British company in the deployment of the ICL Value-Added Network in Britain. The ANA

6502-driven Econet file server.

However, the real bonus will be in the newly-released range of Torch 68000 processors that can connect as second processors to the BBC computer. Torch has recently begun advertising these as attractive BBC upgrades capable of supporting up to 80 Megabytes of hard disk and running a complete version of Unix. Its British advertising has claimed that, at £2900, the BBC microcomputer with one hard and one floppy disk, 256K RAM, a Z-80 processor and the 68010 second processor, represents the cheapest available system running full Unix (only version III though).

The availability of this processor extends the upgrade path of the BBC significantly and fills the gap by delays in development of the National 16032 second processor for Acorn. Presumably something had to be done to match the market profile of Sinclair's QL.

project will link up to 2000 producers, wholesalers, distributors and retail outlets for computer-to-computer dialogue, regardless of hardware incompatibility. Best estimates indicate that by 1986, with some 65 users live on the system, around 1.3 billion characters will be carried each Monday.

## Andas move

Andas (formerly Armstrong and Springhall) has bought up several computer firms and the setting up of a wholly owned subsidiary company. The name of the new firm had not been obtained at the time of going to press. The object is to market, export and develop software for IBM, Wang and other computer systems, to market IBM PCs and Wangs. Andas showrooms will be maintained separately, concentrating on Apple, Olivetti, Sharp, and CAD0 products. The firms bought are: Barlow Electronics, Bay Office Supplies, Computer Experience, E.M. Systems Ltd, International Office Equipment, Lenart Edwards and Associates, Martin Spencer and Associates, Power Systems, Progressive Computers, Shaws Office Supplies, Thomson and Ward, Thomson and Ward (Rotorua), Three Systems and Three Systems Computers. The new group has not yet decided on how it will be represented in the South Island.

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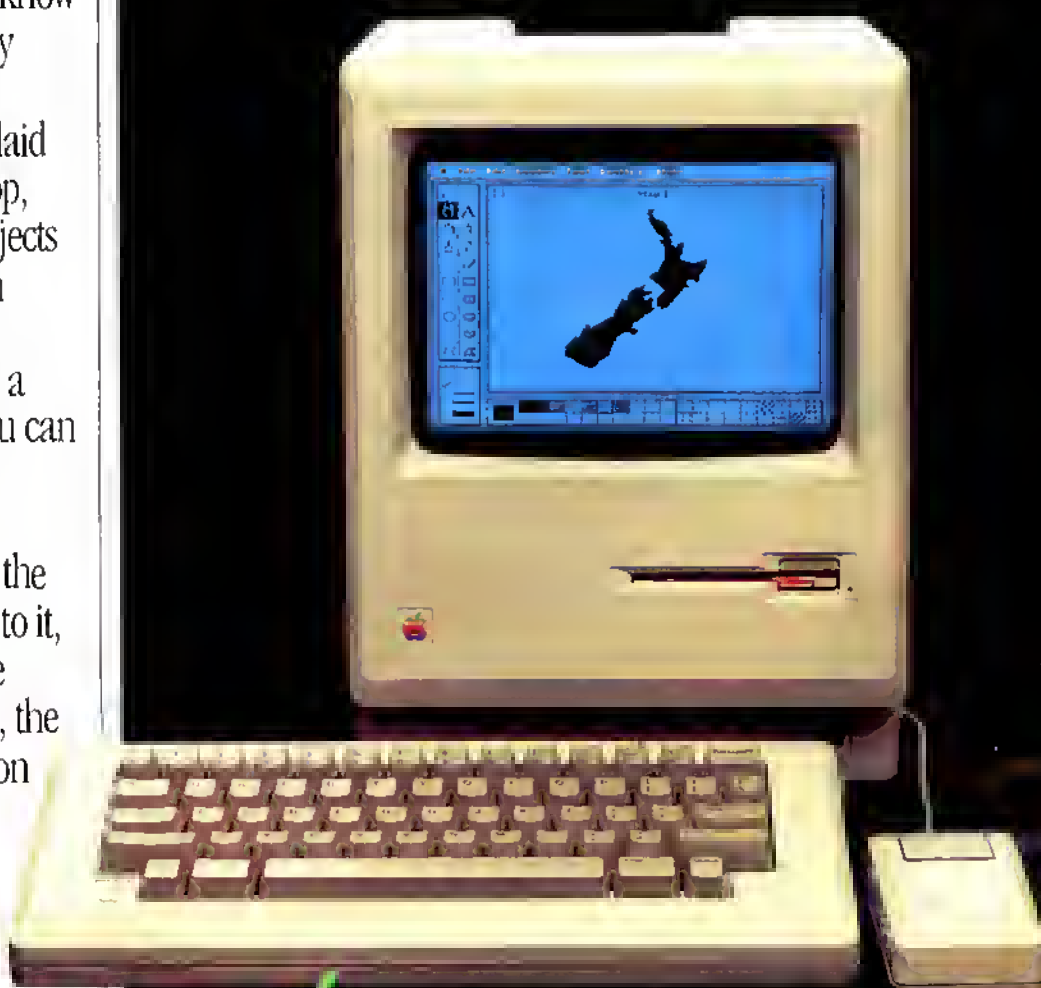
But the real genius of

Macintosh is that you don't have to be a genius to use it. You just have to be smart enough to buy one.

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## Changes for Atari

The chairman of Warner Communications has recently said that major changes for Atari are on the horizon. Atari, a Warner's subsidiary, lost \$US418 million last year, and further losses are predicted for 1984. Atari officials are optimistic that the company is on the road to recovery: however, on June 1, Atari laid off about 700 of the 2000 people at its U.S. head office. Negotiations are under way between Atari and Philips. Philips is firmly established in the business computer market, and it is interested in entering the home market. To this end it is negotiating both with Atari and with a French home-computer manufacturer. Philips is unlikely to buy Atari outright, but it may take a substantial financial stake in the company.

## Macintosh output

The first 50,000 Apple Macintosh computers were shipped in 74 days, 26 days before that number of sales was scheduled to be reached. Apple now expects to sell a quarter of a million of the machines by the end of the year. (It took two and a half years to sell the first 50,000 Apple IIs, and seven months to sell the first 50,000 IBM PCs.) Apple's new automated factory at Fremont, California, is producing 1500 Macintosh computers a day, and this capacity will be doubled by early next year.

## Morrow hard disk

A Morrow with an 11 megabyte hard-disk system, the new CP/M Plus operating system, a full-size terminal, and five application software packages is now on sale in New Zealand for \$8950, the New Zealand agent, Computer Distributors Ltd, has announced. The Morrow has 128K RAM, 8K ROM, a 400K floppy disk drive, a Centronics port, three RS232 serial ports, and a RS422 serial port for communications. The applications software includes New Word word processor, SuperCalc, a spelling checker, and the Personal Pearl database manager. The machine is the Morrow Micro Decision 11. Morrow says the hard disk is two to four times faster than other hard-disk systems that do not have an integrated design.

## DSIR Survey

Questionnaires have gone out to software firms for the New Zealand

survey. The study is being made by the DSIR and the Department of Trade and Industry to document the facts and figures about the software industry in this country. If you are in software and haven't received your copy yet contact Martin Kaiser at Wellington 666-919 pronto. If you do have a copy, you shouldn't. It should have been returned at the end of June. Hurry it along, please.

## Fast chip

NEC, of Japan, says it has developed the world's fastest 64K static RAM chip. The chip needed just 40 nanoseconds for access, compared with 100 to 200 nanoseconds for ordinary types of 64K S-RAMs, the company said. One nanosecond is equivalent to a billionth of a second.

## New Burroughs

Burroughs has launched a modular business microcomputer, the B25. The major feature is its modular format: a separate screen and keyboard and a series of "snap together" modules, including memory, floppy and hard disk drives, communications peripherals, and graphics. Mr Michael Goldrick, general manager of Burroughs in New Zealand, says the B25 is substantially faster and more powerful than its predecessors, the B21 and B22, although still compatible. Burroughs will market the B25 itself as well as through dealers.

The basic stand-alone system includes a central processor with 256K of RAM, a 30cm display, keyboard, and a dual floppy disk storage module. A 10Mb floppy/hard disk option is available with further expansion to 40Mb. Colour and graphics will also be available.

The operating systems for the B25 include the B20 Operating System (BTOS), MS-DOS and CP/M-86. A dual floppy based B25 will be available in New Zealand from \$NZ8500.

## Screens

Two new technology devices are looming up as replacements to cathode ray tubes and LCDs for computer screens. They are electroluminescence screens, at present being produced only by Sharp, in Japan, and gas-plasma screens. The Sharp EL screen is being used on the Compass portable, produced by Grid Systems, and the production price of the screens is

expected to drop steadily. It is suggested they will make up to 16 per cent of the screen market by 1992. However, the gas-plasma screens are likely to be too expensive for microcomputers for many years. These flat screens are being made by IBM now and Burroughs and the Plasma Graphics Corporation have set up a joint venture that may also produce them.

## Copyright

The Australian Government is legislating to include software in the present copyright category of "literary works", giving programs the protection that applies to books and other written work. The move comes after a decision by Mr Justice Beaumont in the Federal Court last year that certain categories of computer software were not protected as "literary works" under the Copyright Act of 1968.

## Speed entry

High-speed data entry into computer mainframes, at rates in excess of 25,000 keystrokes per hour, is now possible with a package being marketed in New Zealand by Burroughs. The package teams up the Burroughs B20 business microcomputer with software developed in conjunction with the American firm, Iowa Computer Resources. Dubbed ICR InForm, the package is believed to be the first microbased, high-speed data entry system. The system essentially uses the B20 micro with powerful software as a terminal for high speed data entry into mainframes. Entry can be either through a single "stand along" work station or from a cluster of up to 10 B20s.

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## Software ball gazing

The future of the software market will probably be in the field of expert systems — systems which can be quickly tailored to the users' needs. But this is not likely to happen quickly, predicts Ron Chernich, general manager of Arcorn Pacific, an Australian-based software company.

People purchasing "user friendly" software — no programming experience necessary — must accept the limitations of the program and be made aware of the huge costs of customisation, he said.

Customisation would always be necessary for certain applications but generally purchasers should suit the software that best suits their needs and be prepared to adapt it, possibly retaining some 'long hand' methods peculiar to their business.

"It is a pioneer industry and the ground rules are still being set.

"The increasing cost of human resources means the software industry can make a large contribution to the productivity and cost effectiveness of businesses. But those same human resources can prove less than cost effective in customisation and purchasers need to be aware of this.

"They also need to be made aware of limitations of different packages because to purchase software under the misapprehension it will handle more than it is designed to means the industry ends up dealing with

negative attitudes and distrust," he said.

Arcorn Pacific is Australasian agent for Ashton Tate (dBASE II) and Digital Research (CP/M) software and it is currently looking for a master distributor in New Zealand.

### dBase III

Ashton Tate has announced an improved version of its popular database language, dBase II. Called dBase III and it will initially be available for the IBM PC (and its compatibles). Versions for other computers will be produced in due course. dBase III offers "over a billion records" compared with dBase II's limitation of 65,000, but this phenomenal figure will be limited by the capacity of the computer it is running on. dBase III also has better sorting facilities (binary search and indexed sequential) and enhanced reporting facilities. It comes with a new manual and revamped packaging. dBase III will sell for \$US695 in the United States, but existing users of dBase II will be able to upgrade at a lower price.

### HP briefcase

Hewlett Packard will be releasing its new briefcase computer in August. The company is also trying desperately to meet orders for its new ink-jet printer, which is in short supply.

### Videotex

About 90 representatives of businesses concerned with the development and use of videotex attended a recent meeting in Wellington convened by the Post Office, marking the halfway point in the two-year development period agreed at the meeting in May, 1983, on videotex standards. The recent developments relating to videotex were reviewed. These include: the recent announcement of a flat-rate call charge of 8c a minute, irrespective of distance, to the users of the videotex access switch; the formal inauguration of the videotex access switch on May 29. Six models of videotex terminal have been type approved, and the Post Office believes that about 150 terminals are in use. The meeting was told that the Post Office had the option of using the packet-switching network if there was a rapid increase in demand for network services such as videotex.

### Army Poly

Australian Army signals instructors are now operating a Poly computer system to carry out training in keyboard skills. Eighty-

seven Poly learning support computers and an additional eight network controllers are the physical components of a \$NZ500,000 plus defence supply contract awarded last October and now completed by local computer company Progeni. The Lower Hutt based software and systems house has finished the manufacture and installation of three classroom sets of Polys at Watsonia Barracks near Melbourne. Watsonia, which even boasts its own satellite tracking disk, is one of two Army bases to add the Poly equipment to its extensive range of modern communications facilities. The other is in Queensland.

### Boeing/Progeni

Boeing Computer Services, a division of the Boeing Company, and Progeni, Lower Hutt have held introductory talks in Seattle to discuss the possibility of joint marketing ventures. A Boeing Computer Services spokesman termed the talks useful and informative.

### Changes at Brother

Brother Distributors Ltd, the office equipment distributor, has appointed Mr Graham Walshe general manager. Mr Walshe previously was the firm's national sales and marketing manager and fills the vacancy created by the retirement of Mr R.R.A. McLauchlan, the managing director.

### Enterprise N.Z.

An Epson HX20 micro will be aboard the Enterprise New Zealand when the Bruce Farr-designed yacht tries to win the Whitbread Round-the-World yacht race for New Zealand. It has been presented to the yacht by Microprocessor Developments Ltd, the New Zealand agent for Epson. With the machine was presented a navigation software package. The total value of the gift was \$1995.

### ICL result

The ICL Group pre-tax profit for the first half of the current year was \$14.3M up at \$41M (after allowing for changes in the rate of exchange between sterling and the New Zealand dollar). Revenue, at \$925.6M, was 8 per cent up on the first half of the corresponding six months of the previous financial year. Sir Michael Edwardes, the new chairman (he was the man who put the Leyland group together in Britain) says equipment orders rose faster than revenue in the half-year.

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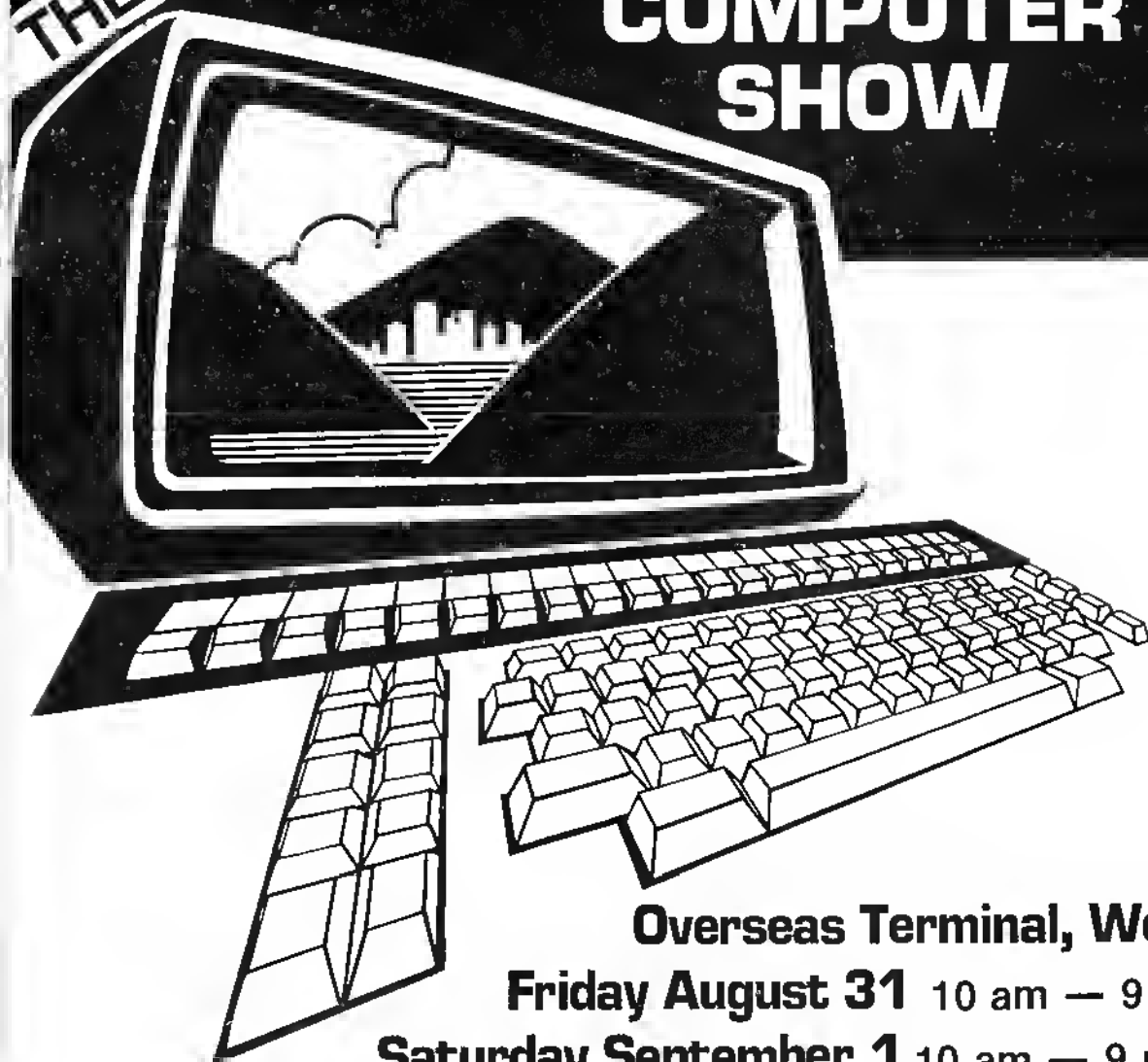
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## MICRO NEWS

### Fibre optics

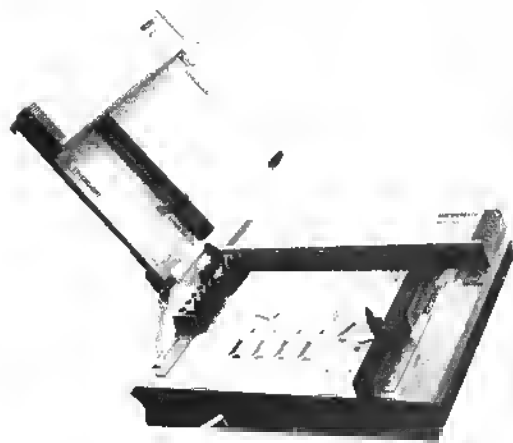
IBM engineers have developed a microchip that interfaces with fibre-optic cable to act as a data-communications amplifier or receiver. Fibre optics uses light impulses rather than an electric current to send and receive computer data between other computers and attached input/output devices. One fibre optic cable replaces 24 copper wire cables and their associated connector. The new receiver chip accepts and processes 400 million bits of computer data per second. That's equivalent to more than 17,000 pages of typewritten data. The older, common copper-wire receivers, can process only 25 million bits per second. Fibre optics has the additional advantages of being lighter, cheaper and tamper resistant.

Fibre-optic transmission uses strands of highly refined glass to send laser or light-emitting diode light, pulsed to convey computer data signals. A converter at the sending end of the fibre-optics line changes electronic signals to light pulses and sends the signals through the glass fibres. A converter at the receiving end changes the light back into electronic signals.

### Roland plotters

The Roland range of flat-bed plotters is now available from E.C. Gough, Ltd (P.O. Box 22-073, Christchurch).

The DXY101 model sells from \$1250 and the DXY800 (pictured) for \$1495.



### Challenger delayed

Dick Smith Electronics advises that because of high demand in Australia, stocks of the IBM-compatible Challenger computer (reviewed in *Bits & Bytes* last month) will not be available for two to three months in New Zealand.

### Rigid disk cartridges arrive

While floppy disks, in their various sizes, have the lion's share of the storage media market at present this is expected to be reduced rapidly in the next few years by rigid disk cartridges.

These cartridges are removable hard disks that allow up to 10 megabytes of storage on a medium the same size as a 5 1/4 inch floppy disk.

They plug into half-height Winchester disk drives (again no bigger than the present slimline 5 1/4 inch floppy disk drives). These drives come in two forms:

1. Those where all the storage is

completely removable;

2. Those where part of the storage is fixed and part is removable (usually five megabytes is devoted to each).

As well as the greatly increased storage capacity, rigid disk cartridges also remove the back-up problems of Winchester disk drives.

Solstat Industries (P.O. Box 13-183, Christchurch) now has available Dysan's rigid disk cartridge and in addition has been appointed New Zealand agent for DMA Systems removable disk drives.

The cartridges cost \$400 each but no pricing is yet available on the drives.

C oming  
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T h e  
E t e r n a l  
R e t r e a t

The  
Micro  
Widow

They say that computers are the thing of this generation, but to a computer wife, they can be a great frustration. Husband glued unto the keyboard, eyes fixed upon the screen, concentrating solidly, or is he in a dream?

Doesn't really matter, the result is just the same

he continues to ignore you and play computer games.

As he hasn't your experience and typing education,

he grumbles over the keyboard for a long duration.

When you think he's finished and vie for some attention,

he pops into graphics and draws things I dare not mention.

Computer games were first to come to entertain the friends,

but they're so complicated the evening never ends.

Games for the children were another cunning scheme,

they just adore their Daddy and his computer screen.

He tells me the language is BASIC, simple to understand,

but to me a male sheep is usually called RAM,

Floppy disks, word processors, extras by the score,

They cost a lot of money and he wants more and more.

He does like his computer, he really thinks it's neat,

He still says he loves me, and thinks I'm rather sweet

But I really wondered which of us would first be obsolete?

Finally in order that wifely sanity and marriage would survive

I devised a sneaky plan and learnt to compromise.

I read his books, glean the mail and all the magazines,

try to understand the jargon and know what it all means.

When he's out I compute and get my friends to have a go,

After all it was my money that bought it, too, you know.

As time goes by I discover more programs I like to run,

and I am sure a computer wife's lot can be a happy one.

Ultimately I suspect that in our house we'll find

It's my dear old hubby whose waiting for computer time.

P.S. To a computer wife, true success of course would be my poem in print in *Bits & Bytes* and a little spare cash for me.

— Cathy Arrow

# The CAT's out of the bag!

Dick Smith Electronics presents The CAT—more powerful than an expanded Apple IIe plus compatibility — for a fraction of the cost.

## 1 It's Apple compatible!

That means that you can use a huge range of programs (approximately 15,000) designed to run on the Apple IIe — without paying the Apple IIe's price! Programs for fun, for learning and for business. And because you aren't 'locked in' to any one supplier, you can save a fortune: buy your programs from us, or buy them somewhere else if they're cheaper! (You could even buy them from Apple...)

## 2 It's more powerful!

With its very large internal ROM memory (twice the size of the Apple — and a larger, easier-to-use keyboard (81 keys compared to the Apple IIe's 63 keys!), high resolution graphics, 8 colours, 6502A second generation processor, it has the features you need without paying one cent extra for 'standard'.

**THE cat**  
DICK SMITH PERSONAL COMPUTER



## 3 It's so easy to use!

Just plug it into a video monitor (in any B & W or colour TV set with a \$49.95 modulator) — and you're ready to go computing. You don't need to buy anything else! But when you want to expand, The CAT is ready for serious computing with a range of top quality add-ons and peripherals all at low, low Dick Smith Electronics prices.

## 4 And it's only \$1195

The bottom line is always the price! And The CAT wins paws down. Feature for feature it more than stacks up against the Apple IIe, the Microbee, plus any other other computer you care to name.

And we don't load up the 'options' either — a fully expanded Apple IIe costs over \$3000 while The CAT, similarly optioned, sells for less than \$1500. Affording the best computer has become a whole lot easier... with The CAT, from Dick Smith Electronics.

Basic CAT computer X-7500	\$1195.00
Disk Drive X-7505	\$495.00
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Phone: \_\_\_\_\_  
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Send to: Mail Orders Private Bag, NEWMARKET  
or call into your nearest Dick Smith Electronics Centre  
for a demonstration.

## MICRO NEWS

### Xerox 16/8

One of the great mysteries of microcomputing is why Xerox, whose research facility at Palo Alto has an outstanding list of firsts to its name, has such a low computing profile. The answer lies in a corporate history that has a \$US2 billion skeleton in the cupboard: an abortive essay into mainframes in the late 1960s. It also lies in the fact that many Xerox products have a different brand name (like Shugart drives) and computing research is a small share of all Xerox research activity (under 20 per cent).

Xerox has now produced a low-end machine for the business market, the 16/8-PC. Like the DEC Rainbow it has a Z80 plus a 16-bit chip (although in this case an 8086). Apart from this it doesn't look too special at the moment. However, new management at Xerox is reported to be seeking to move towards releasing many of the current in-house products. The micro release of the language, Smalltalk, is the first but other software and hardware innovations are set to follow.

### CP/M on a chip

Digital Research and two American chip makers have agreed to put the CP/M operating system on to ROM to give cheaper systems, lower memory demands and make the system easier to use. Torch computers may smile: users of their Torchpack have been using a look-alike system on a ROM for almost 18 months.

### First thought for users

Users' interests will be top priority in marketing the Atari range of computers and games. Felix Meyer, Atari divisional manager for Monaco Distributors which has been appointed sole agent for Atari products in New Zealand, says the company has taken a hard look at the needs of users.

The 400XL, including a BASIC cartridge, power adaptor, user manual and BASIC construction manual, will retail at \$399; the 600XL new 16K version machine, with full typewriter keyboard, will retail at \$599, and the 800XL 64K machine will retail at \$899.

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- Easy-to-read wide display, 20 columns x 8 lines (160 characters), 160 x 64 dots
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• 225(W) x 310(D) x 76(H) mm



**FP-1021FD1**  
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## HARDWARE REVIEW

### The Cat

# Dick Smith paws on Apple

By Alex and Fred Wong

I can feel the ghost of my old System-80 leaning on my shoulder as we carry the Cat, lent to us from that Australasian firm, Dick Smith Electronics, Ltd, into the computer room.

Targeted primarily toward the home market, the Cat aims to provide a cheaper alternative while retaining Apple software compatibility.

### The hardware

As Fred eagerly unpacks, I watch with a critical eye. The Cat has a lower profile than an Apple II, with a two-colour case in cream and fawn. The eight function, four cursor, break and rubout keys are in camel. Tab, caps lock, and separate enter keys are in orange. The other keys, including the separate numeric keypad, are in cream.

The installation is easy, as Fred finds out, while I relax in a corner. The plugs on the back are comprehensive: aside from the power socket, on/off switch and reset button, there are I/O ports for cassette, RGB and composite video via DIN connectors, as well as one for the built-in Centronics printer interface. There are disk controller, RS-232 and RF modulator



*The Dick Smith Cat*

connectors as well as a colour defeat switch and sound volume control, both of which do what they say. There aren't however, any Apple-type interface slots, which could prove limiting to further expansion.

I inspect the completed set up and discover that the case is solid and the keys feel positive, if somewhat mushy at first. The peripheral connectors are tight except for the RGB cable, which wobbles a bit.

Applewriter, Transylvania, Rear Guard (34 programs).

### Emulator needed

Programs that *needed* FP BASIC/Emulator: The Filer, Copy II Plus, Magic Window, Typing Tutor II, Aztec, The Quest, Crush, Crumble and Chomp, Escape from Rungistan, The Golden Voyage, Locksmith, Apple Cillin II, Electric Duet, Logo, Roulette (Integer BASIC) (14 programs).

### Didn't run

Programs that did not run correctly: Little Brick Out, ProDOS 1.0.

Generally, the quality is good and solid, though there are a couple of rough edges.

### Compatibility

The biggest drawback for the Cat is Apple software compatibility but because of copyright infringement fears, there is no firmware, or ROM, imitation. Instead, Apple's floating point (FP) BASIC and Apple's DOS 3.3 are provided via the Filer program on disk that is loaded into the 16K RAM, add-on emulator cartridge.

Fred strikes problems, though, when he boots up and tries out the functions provided on the Filer disk. Apart from the up arrow key exciting the program accidentally, the disk test section won't run. We don't know at the time, because it doesn't say anywhere, but FP BASIC needs to be loaded into the Emulator cartridge first. When he gets over these initial setbacks, though, he starts to put the Cat through the acid test of Apple compatibility.

Fred runs 50 test programs on the Cat and 68 per cent work with or without the Emulator cartridge and

## Apple programs tested

### Okay

Programs that ran *without* FP BASIC/Emulator: Seafox, Taxman, Eliminator, Multiplan, Choplifter, Keyboard Tutor, Slideshow 2, VisiCalc, PFS — File, FID, Wizardry — proving grounds, Lode Runner, Crisis Mountain, Mouskattack, Olympic Decathlon, Swashbuckler, Hadron, Zaxxon, Zenith, County Fair, Dung Beetles, Thief, Crossfire, Cannonball Blitz, International Gran Prix, David's Midnight Magic, Night Mission, Apple Panic, Time Zone, Zork, II, Classic Adventure,

# HARDWARE REVIEW

FP BASIC; 28 per cent need the FP BASIC program loaded into the Emulator to work; and 4 per cent don't work at all. Which means a compatibility rate of about 96 per cent.

We find two reasons for incompatibility: 1 — programs that use Apple low-resolution graphics, these being absent from the Cat; 2 — programs that need 64K of RAM (using up the Emulator RAM) as well as FP BASIC in ROM, which unfortunately means that Apple's new operating system, ProDOS, won't work. In this respect, the Cat is not compatible with the Apple IIe running ProDos, and all new software has been on ProDos.

Apart from this, Fred notices that the video display in Apple's high-resolution graphics mode is decidedly inferior, due to an apparent lack of contrast and brightness.

## BASIC

Of course, the Cat leads a double life of its own as well and Fred is about to test the Microsoft version 2.5 BASIC, which it has in ROM. He finds it an advanced BASIC, with useful statements such as PRINT USING and WIDTH (which controls the built-in 40 to 80 column text window), SWAP (for swapping variables) and extensive sound commands, in addition to the usual vocabulary. The eight function keys also have routines such as Circle, Square, and Paint, which help utilise the excellent graphics capability of the Cat, having a maximum resolution of 560 x 192 pixels.

## Storage

While using the Microsoft BASIC, 46K of user RAM is available of the 48K that comes with the basic machine. When running FP BASIC in the Emulator cartridge with DOS 3.3, 35.5K RAM is available, and we don't see the Cat supporting larger amounts of RAM in the near-future. The disk controller can handle only two drives and we have compatibility problems when using Apple's Disk II drive with it (such as not being able to format a disk). However, these are not evident when we use an Apple compatible Super 5 disk drive. There are no micro-floppy or hard disk drives available from Dick Smith and the only alternative storage is tape, using Apple's rather primitive cassette system.

We find the writing style easy to understand and fairly accurate in

## Microcomputer Summary

<b>Name:</b>	Dick Smith Cat.
<b>CPU:</b>	6502A @ 2 MHz.
<b>RAM:</b>	48K, (64K with Emulator cartridge).
<b>Display:</b>	24 lines by 40 or 80 characters, upper and lower case in 7 x 8 matrix, with true descenders.
<b>Graphics:</b>	High resolution with 4 lines text 280 x 160 pixels High resolution without text 280 x 192 pixels Double resolution 560 x 192 pixels Bit image (no colour restrictions) 280 x 192 pixels
<b>Languages:</b>	Microsoft BASIC V.T. Version 2.5 in ROM. Machine code monitor in ROM. Optional languages: Applesoft BASIC, Pascal, Logo, FORTH, Pilot, Assembly.
<b>Keyboard:</b>	Full typewriter style with 80 auto repeat keys including eight shiftable function keys, four cursor keys, numeric keypad, and six special purpose keys.
<b>Audio:</b>	Built-in speaker with volume control.
<b>I/O:</b>	Monochrome or colour composite video, RGB, cassette interface, RS232 connector, disk controller connector, Centronics printer interface, system I/O BUS (expansion slot), joystick port.
<b>Price:</b>	\$1195.
<b>Options:</b>	Emulator cartridge ..... \$149.95 Disk controller ..... \$149.95 Floppy disk drive ..... \$495.00 Printer cable ..... \$ 44.95 RF Modulator (for use with TV set) .... \$ 49.95 Dual joysticks ..... \$ 49.95 The Filer (with Apple DOS and FP BASIC) ..... \$ 59.95 RS 232 serial adapter ..... \$149.95 RGB cable ..... \$ 44.95 RGB monitor ..... \$995.00 High-resolution, green-screen monitor .. \$395.00

*Review machine supplied by Dick Smith Electronics, Ltd.*

content but many parts cover only the basics. Some vital points such as loading FP BASIC into the Emulator are covered only in Appendix A of the DOS manual. A chapter on using the printer is inserted in among BASIC command usage and to add to the confusion, Apple's hi-res. graphics are called lo-res., while double res. and bit image are unique to the Cat, and the lack of Apple lo-res. isn't mentioned at all! We feel a beginner would have a hard time understanding the operation and capabilities of the Cat through these manuals.

## Peripherals

The Cat disk drive case is tough, low, and perhaps unnecessarily wide. Once the plastic drive door lever is closed, its operation is quiet and smooth. The other peripherals: the Emulator, Disk Controller, RF modulator and RS-232 cartridges all look and work well. For a dedicated game player like me, however, the twin joysticks (they are sold only as

pairs though I use only one) are disappointing. They are not self-centering: I can't put them on the table conveniently when in use and they are over-sensitive, making control shaky.

The printer cable will connect the built-in interface to any Centronics parallel printer and combined with the 80-column mode would make the Cat a powerful word processing machine.

## Documentation

The documentation — User's manual, BASIC Reference Manual and the DOS Manual (that is part of the Filer), come in binders that make the pages hard to turn. They all have good contents pages but they also lack any form of an index. The section beginnings are sometimes hard to find as the headings can be obscure. All the peripherals come with booklets that mostly amount to little more than installation instructions.

**ENTER NOW!!**

# Your chance to win a \$1200 CAT (The computer that is)



**It's simple!** Just list your answers to the questions below and post to:

**CAT Competition, Box 827, Christchurch**

All entries must be received by September 3  
(the winner will be announced in the October issue of Bits & Bytes)

Question 1 *What kind of microprocessor does the CAT have?*

Question 2 *How much RAM does the CAT have inbuilt?*

Question 3 *How many function keys does the CAT have?*

Question 4 *Name three standard features of the CAT.*

Question 5 *What computer is the CAT up to 96 per cent software compatible with?*

*Please explain in 100 words or less what you intend to use the CAT for if you win it.*

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**Conditions of entry**  
The contest is not open to Dick Smith Electronics and BITS & BYTES employees or their immediate families. The judges' decision is final and no correspondence will be entered into. All entries must be received by midnight September 3, 1984.



## HARDWARE REVIEW

### Summary

Over all, the Cat is an impressive computer, especially in the area of Apple compatibility (though, it is hampered by poor documentation and the trouble of pre-booting FP BASIC), which must make it tempting to users who already have access to Apple software but cannot or will not be able to afford an Apple, as well as to users considering other home computers in this price range.

As Fred sadly repacks the Cat for its homeward journey, I feel a weight lift from my shoulder. Probably, my old System 80 is satisfied with its successor and has finally ascended to computer heaven.

*Alex and Fred Wong are Auckland brothers. Alex is the software enthusiast, Fred is a hardware enthusiast. Distributors and agents with Apple and Apple-compatible products are invited to put them on their mailing list:*

19 Woodbridge Lane  
Milford  
Auckland.

### HP headquarters

Hewlett-Packard New Zealand, Ltd, has released the design of its proposed 10-storey, \$8 million national headquarters in Wellington. The purpose-built head office will incorporate demonstration and training facilities, a personal computer centre, customer facilities and offices. The 8000 square metre building will be owned by the company, which will occupy levels two to four as office space. The company's policy, internationally, is to own its own premises. The architect is Ian Athfield, who runs an HP150. Building was scheduled to begin in May with a December, 1985, target for initial occupation.

## Fair Mate cassette deck

By Tony Graham

The Fair Mate CS-666 is a very compact data cassette deck, which appears to be very well constructed. This unit must be one of the best available, especially if your computer has provision for remote tape operation.

Connection to the computer is by the standard 3.5mm phone plugs for input and output, with a 2.5mm plug for remote. However, when used in remote mode only the LOAD/SAVE functions are over-ridden by the computer. The rewind and fast-forward functions will operate without the need to withdraw the remote plug.

A monitor with ON/OFF switch is included so that tape signals are audible on both LOAD and SAVE, with the added advantages of being able to monitor tapes on both fast forward and rewind. These additional functions being called CUE and REVIEW. By using the CUE feature in conjunction with the tape counter you can very quickly find the start of any program.

An LED indicator shows battery condition except on SAVE, when it flashes with the transfer of data.

The tape auto stop function operates only in the LOAD/SAVE mode.

The cassette deck tested LOADED and SAVED programs without any trouble. The manufacturer's instructions recommend loading with the level control at maximum, which proved to be good advice. When using the deck on SAVE the level control does not function, relying on the internal automatic level control (ALC). While no indication is given of required input signal level, the test unit coped with levels from 50mV to 3-volt without any significant change in output level (checked with 1 KHz square wave).

The rated output is given as 2.4 volts. This turned out to be 5-volt peak-to-peak square wave at maximum, with a significant change in wave-form shape occurring over top half of the level control. Lower settings of the control are unlikely to be effective.

Batteries are only the AA, or penlight size, but with such a compact unit this is to be expected. A 6-volt adapter with a current rating of not less than 150 mA would be required for an external power source.

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### Cassette deck summary

Maximum output	2.4 volt.
Wow and flutter	0.25 (W.T.D).
Signal to noise ratio	33 dB.
Distortion:	3pci.
Frequency response	200 - 6000 Hz.
Power source	6 volt, 4 x AA batteries or adapter.
Dimensions	119(w)x166(d)x32(h).
Weight	455g (without batteries).
Estimated retail price:	\$125.

*Sample unit supplied by AVM Electronics*



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*The TRS Model 100.*



*The NEC PC8201A.*

### TRS 100 and NEC PC8201A

## Two new travelling notebooks

By Rodney Lincoln

Late in 1983 Tandy Corporation released its TRS Model 100 briefcase computer into a growing market, which had previously been dominated in New Zealand at least, by the Epson HX20. The Model 100 has been followed by a very similar machine marketed by the Nippon Electric Company of Japan. NEC has called its computer the PC8201A.

The TRS Model 100 and the NEC PC8201A were both imaginatively designed by the Kyocera Company of Japan, to be a business person's or journalist's travelling notebook and handy computer.

Both computers use CMOS RAM, which enables them to retain programs and data when the main power is turned off. This solves the problem of dumping information on to tape or disk before turning power off. The TRS80 Model 100 and the NEC PC8201A have a large amount of firmware stored in ROM. Both computers have:

- BASIC for programming and calculating.
- TEXT as a handy word processor.
- TELCOM for communications.

The Model 100 has two other programs in ROM which are:

- SCHEDULE: to keep track of appointments.
- ADDRESS: to store addresses and telephone numbers.

The faces of the Model 100 and the NEC PC8201A are exactly the same size as *Bits & Bytes*. The NEC version looks rather plain in its grey and off-white colour scheme, while the Tandy version is packaged smartly in black and white. The front of both machines is about 1in thick. The NEC machine slopes upward to about 2in in the rear while the Tandy machine sits quite flat on the desk.

At the top measuring 20cm by 6cm is the liquid crystal display, it is the same on both computers. This display is quite legible and has eight lines of 40 columns. This screen is large enough for many applications and has a resolution of 240 x 64 dots (pixels) in graphics mode. The screen has a contrast adjustment for optimum viewing under different lighting conditions. I found reflections from the glass plates protecting the screens of both computers to be quite a nuisance.

### BOTH KEYBOARDS EXCELLENT

The keyboards of both machines are excellent for their logical layout and tactile response. They are both

professional QWERTY types, with good spacing and full travel. Most typists will quickly become familiar with them. The Model 100 keyboard has 72 keys, including eight programmable function keys, and separate keys for paste, print, label, and pause/break. The cursor is controlled by four in-line keys at the top right of the keyboard.

The Model 100 also has Code and NUM keys. The Code key is used to produce special predefined characters. The NUM key causes keys in the lower right corner with numbers on them to be used as a 10-key numeric pad.

The keyboard on the NEC PC8201A is similar to the Tandy's, but has fewer keys: 65. It has five function keys and has an excellent cursor pad to the right of the keyboard. This keyboard also has escape, tab, control, caps lock, and graph keys. The graph key is for user-defined graphics symbols (up to 125 at once). Above the normal typewriter keyboard are two other keys: paste/insert and delete/backspace key.

Also on the front panel of these computers is a low battery light. Both computers operate on four AA-size batteries and these keep the computer running for up to 20 hours or less, depending on the amount of RAM installed in the computer. When the normal power supply is exhausted a separate battery protects the memory for up to three weeks. This battery is recharged when the normal power supply batteries are replaced.

# Model 100 details

One of the strengths of the Model 100 is its input/output facilities. Data can be stored and retrieved from a standard cassette at either 500 bauds or a fast 1500 bauds.

The built-in modem can be used for transferring data to or from host computers over telephone lines. This gives the business representative freedom and flexibility to transfer data, reports, memoranda, etc, to a home base, using an acoustic coupler with the Model 100 in TELCOM mode. TELCOM works in two modes. First, it lets you

automatically dial any number in the ADRS.DO file. Second, in TERMINAL mode it permits computer-to-computer communications.

Once the TERMINAL mode has been used to access a host system, incoming information can be stored for viewing or printing (download) or transmit files previously prepared from "text" (upload). These operations can be performed with function keys F1 to F8.

Porterfield Computers, Ltd, the agent for the Model 100, says that the ideal companion host computer for the Model 100 is the new TRS80 Model 4P Transportable, with an optional built-in modem. Unfortunately, the Model 100 is as yet unable to access "New Zealand database" because it uses the Bell standard of communication, while our

database uses the CCITT standard. The interface device can be configured to the CCITT standard, but there is a further hardware problem which is at present under consideration.

## DISK/VIDEO INTERFACE

Tandy has recently unleashed a disk/video interface for the Model 100. The interface can be expanded to two single-sided, double-density 184K disk drives. These are standard 5¼in floppies designed to help in storing and retrieving files easily and quickly. The Model 100 disk/video interface lets you enjoy a 40 character by 25 line screen display on

## Microcomputers summary

Name:	TRS 80 Model 100.	NEC PC8201A.
Manufacturer:	Tandy Corporation.	Nippon Electric Company.
Microprocessor:	80C85.	80C85.
ROM:	32K.	32K.
RAM:	8K, expandable to 32K.	16K, expandable to 96K.
Keyboard:	72 keys; Professional type.	65 keys, plus cursor pad, Professional type.
Clock speed:	2.4 MHz. Real time clock/calendar.	2.4 MHz. Real time clock/calendar.
Display:	LCD: 8 lines x 40 columns.	LCD: 8 lines x 40 columns.
Language:	Extended Microsoft BASIC.	Extended Microsoft BASIC.
Sound:	Single channel piezo device.	Single channel piezo device.
Input/output:	Cassette (500 or 1500 baud), Centronics, RS 232C, Bar-code reader, modem (phone) connector.	Cassette (600 baud), Centronics, RS 232C, S10 1, S10 2, Bar code reader.
Special features:	Disk/Video Interface available. Built-in modem.	CMOS RAM packs available with built in power supply.
Price:	Model 100 8K: \$1995. Model 100 24K: \$2495.  Extra RAM 8K: \$250.  Disk/Video Interface: \$2350. Bar-code reader: \$275. Acoustic Coupler: \$102. Daisy wheel printer: \$1350.	With std 16K of CMOS RAM \$1801.  Expansion RAM chip 8K \$162.  32K CMOS RAM cartridge. \$569. Thermal printer \$432. Data recorder \$249.

### RATINGS

		(out of five)	
Documentation:	4		3
Ease of use:	4		4
Language:	3		3
Expansion:	3		3
Value:	3		3

Review machines supplied by:

Porterfield Computers Ltd, Dominion Rd, Auckland.

Wm. Scollay, Ltd, Shortland St, Auckland.



## HARDWARE REVIEW

any NTSC standard TV, or using a monitor it can display 40 x 25 characters or 80 x 25 characters.

The Model 100 also has a RS232C port and a Centronics printer port, and it connects to a standard bar-code reader.

Underneath the computer, a small compartment contains an empty 40-pin socket with the system bus on it and a smaller 28-pin socket (also empty). This, it has been vaguely rumoured, is designed for extra ROM. There could be more developments in store for the Model 100 using these two ports, however, Tandy, in keeping with its normal policy, is not giving away any hints or clues about these ports until the goods are available for sale.

Some of the software available for the Model 100 is: spreadsheet, text formatter, memory locate, musical keyboard, games, investment analysis, statistics analysis, BASIC language lab, graph plotter, personal finance, simple calc, and executive calendar.

The Model 100 is very similar to the NEC 8201A in operation and uses a

## Model 100 screen on power up

*When the Model 100 is turned on for the first time the screen looks like this.*

1: The first line of the display indicates the day, date and the time.

2: The second line lists the names of built-in applications programs.

3: The remaining area up to the seventh line is reserved for the

reasonably standard form of extended Microsoft BASIC. It is quite a friendly computer allowing users to call up files and menu at any time. The computer has a real time clock and calendar and the basic model comes with a built-in 8K of RAM, of which about 5K is available to the user. The other 3K of RAM is used for the operating system. RAM can be expanded in 8K steps to a maximum of 32K RAM. When the computer is turned on a menu is displayed and by stepping through on the ENTER key any one of the five in-built programs can be chosen.

names of other programs or text you will create when using the computer.

4: The bottom line on the display allows you to select a text document (memoranda, addresses, etc) or program (select). It also displays the amount of the computer's memory that is free for use.

1. TEXT: for word processing and text preparation.
2. TELCOM: for communication with other computers.
3. SCHEDL: to keep track of appointments and other schedules.
4. ADDRSS: to store addresses and telephone numbers.
5. BASIC: which allows you to write your own programs.

TEXT is a handy word processor that allows files to be opened, closed, and edited. It allows blocks of text to be defined and 'cut', which causes the

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## HARDWARE REVIEW

defined text to disappear. Blocks of text can be moved to other files with the paste key and files can be copied with the copy key.

### Details of NEC

The PC8201A has 32K bytes of ROM and starts with 16K of RAM. This is expandable to 64K internally. A 32K RAM pack with its own battery backup can be added. This external RAM pack can be used as a solid state disk. When the computer is fully expanded this gives three banks of 32K of RAM and by use of the BACK UP CO. instruction, information can be copied from bank to bank.

The rear of the case is well set out and is clearly marked with the following I/O ports:

- A cassette interface working at a good 600 bauds.
- A Centronics printer port.
- An RS232C port with a maximum speed of 19,200 bauds.
- A bar-code reader port (Hewlett-Packard std).
- Two serial interface ports.

The rear of the computer also has a reset switch, a memory protect switch and an external DC supply port.

The computer can work into most standard cassette tape recorders as well as NEC's PC8201A portable, battery-operated data recorder. An applications software kit is supplied as standard with 14 programs including:

- Character definer for building graphic characters.
- Text formatter.
- Bank switch utility.
- Music program, music data and two games.
- Terminal model selector.

NEC has also produced 10 other tapes at prices to be announced. Some of which are:

- NEC 8085 Assembler/development tool.
- NEX general statistics.

- NEC personal plan for use with Multiplan and VisiCalc files.
- Other financial and statistical software.

The PC8201A is equipped with NEC's version of extended Microsoft BASIC. This is quite a straight-forward version of BASIC which is very easy to edit using the cursor, control, insert, and delete keys.

Except for the graphics capability, N82 BASIC is compatible with the NEC BASIC used on the NEC 8000 and PC8800 series personal computers giving access to a library of pre-written software.

Maths is done in single or double precision.

The N82 BASIC Manual for the PC8201A was not as easy to use as it could have been. In particular I found that the index was not all that complete and the book was not overly explicit. The user's manual, however, was much better. Also included is a manual on applications software.

The PC8201A is equipped with three useful programs in ROM. When you turn on the computer the menu is displayed as well as the time, date and the number of bytes free. You position the cursor and press the return key to choose from the following menu: word processor; terminal communications; N82 BASIC interpreter.

TEXT is a handy word processor which allows documents of up to 133 columns to be made, filed and edited. Documents are handled under file names and a buffer file is also available. One handy feature is the word wrap which moves the word on to the next line if it is going to extend past the margin setting. The TELECOM program allows the computer to communicate with other computers or other PC8201A's through a telephone modem with the RS232C interface.

The PC8201A is a powerful and very convenient package. It scores well in an area where there is a demand for highly portable computing power. It is a pity that this little gem will bypass many home users and first time users because of the high cost of CMOS RAM and the LCD displays.

Its innovative features are especially interesting. I like the convenience of its bank switching facility. The use of the CMOS RAM package with battery backup raises many interesting possibilities. For example, it could act as a solid state disk for many applications. If the price comes down on these CMOS RAM packs and the amount of storage space increases they could become very popular in the field of mass storage.

## ICL PERSONAL

### A truly business machine

By George Barna

The only thing personal I can find about the ICL 16 bit Personal Computer Model 36 is in the name. This is truly a business machine; multiuser, multitasking, all the things some need to run a business in top gear, but can't with CP/M. This machine does run a CP/M operating system, but it is CCP/M, which means Concurrent CP/M. (Please note the Model 36 is the top of the ICL PC range. ICL has no less than five other models ranging from \$5,600 upwards)

#### MACHINE CONFIGURATION

There are several configurations available, depending on CPUs (8 or 16 bit), RAM and disk configurations (hard disk size and number of floppies). RAM ranges from 64K to 256K with the 16 bit machines expandable to one megabyte. Both CPUs are available with twin floppies, with capacities a very usable 782K formatted. This is a great improvement on the Model-32 with some 250-oddK.

Hard disks are 5 or 10 megabytes. With a hard disk it comes with one floppy, and with this kind of floppy disk capacity, backups should not be a chore. To some models you can also add up to another two external hard disks of 10 megabyte each. So, this is why I would not class this machine as a personal computer. You'd be shooting sparrows with an elephant gun.

On the 16 bit machines the CPU is the now familiar 8088, running at 5 MHz. The 8 bit runs an 8085AH2, also at 5 MHz. Nothing exciting here. In fact, on the hardware side I couldn't find anything to get excited about, except the terminal. IT IS VERY NICE! Full colour, all attributes (inverse, half intensity, etc), programmable function keys through the program. But it's a shame one can't save the contents of the function keys; all is lost when you switch the power off.

Wordstar was set up to use some of the function keys, but not all, so in practice I found this not so useful.

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## HARDWARE REVIEW

To set up the terminal attributes such as background-foreground colours, baud rates, word length, is a breeze. All done on the screen, and very well done. Programming for screen layouts in the application programs would be a very time consuming job, as everything has to be programmed manually, colours, cursor position etc. Although only once. After that one could merge the routine into every program one writes.

### CONCURRENT CP/M

I have heard about Concurrent CP/M, read about it, but never used it. Now that I have, I like it. Imagine a computer that has four terminals, and you can run from one terminal to the other having a look at each, with different information on the screen, collating the data, and entering it on one terminal. Stop running on this one and just sit down and press a key to switch terminals.

One can also run quite unrelated processes, independently, and collect the output to file. Not bad, for a personal computer!

Multiply all this by four, because the ICL-36 can have four physical terminals, each with the capability of four virtual terminals. That's 16 concurrent processes. However, for these goodies there must be a catch, and there is: Concurrent CP/M will not set the world on fire in the speed department. However, if you have never used a really fast machine you will not know the difference. All in all I find CCP/M very good value for business people and it comes as standard with the machine.

### UTILITY SET-UP PROGRAM

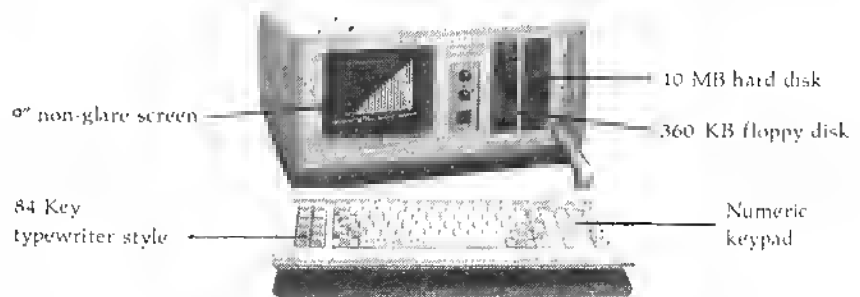
Also supplied are all the programs necessary for setting up the machine the way you want it, using the virtual disk of up to 764K, if you have that much RAM. (For the novice: virtual disk is memory that's treated as a disk drive and because it's RAM, it's very fast, faster than a hard disk.)

Also supplied is a HELP program that explains the Digital Research programs plus the ICL supplied utilities, and how to use them. The programs include: HEADPARK which parks the hard disk heads to prevent damage during transport; OPTION which sets floppy disk formats, so that you can read data from disks on the old ICL format disks, but not write. I was told the IBM option will also be available; TOD which sets the current date and time of day; TTYSET which sets serial port parameters; DATASAVE which is a hard disk backup utility; VCMODE



*The Model 36 (front) with its ICL team*

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# HARDWARE REVIEW

which changes the virtual terminal background mode; and several other very useful and easy to use programs. Everything about the utilities is up to date in a file.

## LANGUAGES

Languages on the review machine were DRI's Personal BASIC, and Ashton-Tate's dBASE II. (I consider dBASE a language).

Firstly the BASIC. If you can use Microsoft Basic or a variant you will like this BASIC. It is especially friendly for debugging. You can trace variables, execute a program line by line, renumber a PART of the program (which is a beauty!). To load a program you type OLD (program-name), a la BBC. Do your editing, then REPLACE. Have you ever SAVED a program and destroyed something else, ending up with two identical programs under two names? With REPLACE that can't happen.

Editing a program is slightly different from Basic-80, but not enough to have to re-learn everything. File handling is identical, in fact a program written in Basic-80 will run on Personal BASIC without any modification. One can configure BASIC with DDT to have a maximum of over 51K of program memory.

Some corrections to the manual are contained in BASIC.DOC. Print this file out on the printer. It's set up so that when you cut the paper on the dotted lines it will fit into your ring binder exactly. Very neat and thoughtful. Also in this file the dreaded FIELD statement is explained. For new users this statement can present a problem, but here it is explained so clearly, with pictures, that you'll be an expert after the first reading. From a programmer's point of view, I feel Personal BASIC is superior to Basic-80, if for nothing else but RENUM, STEP and TRACE. The last two are heaven sent when debugging.

## dBASE II

I started up dBASE II on USER 1 (incidentally, CCP/M shows the user number just like MP/M does), and typed HELP NEW to see what new commands are implemented. Hello, hello!? LOCK. I write quite a few applications in dBASE, so I was very interested. Was this going to be a windfall, record locking in a multiuser environment. But no such luck. I tried for about two hours to make it work and gave up. I don't know if I couldn't make it work or it

## Microcomputer summary

Name:	ICL Model 36
Manufacturer:	ICL
Microprocessor:	8088
Clock speed:	5MHz
RAM:	256K (expandable)
Input/Output:	Six RS232C ports plus communications
Keyboard:	Typewriter style
Display:	Full colour, 80 x 25 lines
Languages:	DRI Personal BASIC, dBASE II
Operating system:	Concurrent CP/M.
Sound:	No
Cost:	\$12,176 without terminal; works with any RS-232
Peripherals:	RAM upgradeable in 256K blocks at \$1500 per 256K. Additional hard disk units available, Hard disk upgrade connectors standard, \$4928 for 10MB
Other features:	ALL DRI utilities that come with CP/M, SuperCalc

**Reviewer's Ratings:** (from 1 to 5, 5 being the best).  
Documentation: 3, Ease of use: 4, Language: 4, Expansion: 4,  
Value for money: 3, Support: 4.

*Review unit from: ICL (N.Z.) Ltd, Wellington. Software Support from Computers for People, Taranaki Street, Wellington.*

just didn't work. I asked ICL about this command, but nobody knew anything about it. Even ICL's software supplier didn't know it existed.

Otherwise dBASE II, v2.4 worked very predictably, as designed, with most of the bugs in v2.3 ironed out.

SuperCalc version 2 was also supplied with the machine.

## GRAPHICS

GSX graphics files were on the disk, but no documentation, so I couldn't try it. On occasions something very disturbing kept happening. The terminal just hung up. Nothing short of cold booting could bring it back to life. This in itself is bad enough. What makes it worse is that there was no pattern as to why it happened or what could have caused it.

## DOCUMENTATION

Documentation is in two parts, the Digital Research obscure manuals, and the much better ICL supplied ones, all in ring binders. DRI has excellent software, but you have to have an arm's length of degrees to understand the documentation. I am not alone in this view. Everybody complains, but do they listen? BASIC.DOC is an exception; it should be the rule. It could have been written by ICL, which would explain why it is so clear.

## CONCLUSIONS

Overall the ICL Model 36 is a good looking; the terminal is a winner. Speedwise it's so-so. CCP/M alone could make the machine worthy of consideration for purchase. If you're into BASIC, Personal BASIC is excellent, for the programmer. It is a truly professional business quality machine. The bottom line of all reviews should be that don't believe anything told to you, go and have a look for yourself. Some features this reviewer does or doesn't like could well be the very things that could affect your application.

## Research agreement

Apple Computer Inc and Sony Corporation have announced an agreement to share existing research on hard-disk technology, enabling Sony to expand its product line of computer peripheral devices for the OEM (original equipment manufacturers) market. Sony supplies Apple with the 3.5in disk drives for use with the Macintosh and Lisa 2. "Our agreement with Sony to share our current hard disk technology reflects the growing relationship that has developed between our companies," said John Sculley, Apple's president and chief executive officer.

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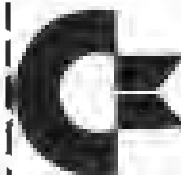
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## MDL's viewpoint

With some reluctance, I am answering your articles on the "schools computers report". Reluctant because although primarily responsible for the controversy, there is little satisfaction to me in continual debate on what is at best a sad and non-productive period in New Zealand's history of microcomputer integration into our society.

It is sad because on the bottom of the heap of scrambling bodies in this affair is our future — our children and high technology.

It is non-productive because although I believe a serious principle of democratic right had to be re-established, the Government itself found this a convenient moment to withhold the finance to install computers in our schools.

Our competitors will no doubt attempt to make commercial gain out of your correspondent's comments; politicians and public servants will dismiss this reply as a political statement and say I should stick to my own profession; and others will see this reply as a challenge they dare not refuse. Oh what joy it must be, if only one could have the "last word".

John Lovelock is managing director and founder of MDL. He was chairman of a Microcomputer Industry Association (MIA) sub-committee that was successful in convincing the Government that the principles of free enterprise required government selection of microcomputers in schools to be opened up to fair trade competition.

MDL is the largest manufacturer of microcomputers in New Zealand and distributes the BMC micro selected as one of the "famous five".

He is replying to the two articles that appeared in "Bits & Bytes" June issue — "No Longer Secret Schools Report Evaluation" and "Background to the Secrecy".

It is necessary to reply to your articles because of misinterpretation of information made by your correspondent. It is also timely to advise your readers that "Nick Smythe" is a nom-de-plume. I cannot think of any other technical or professional publication which would allow supposedly investigative and factual reporting to be published under an "obvious" nom-de-plume. Your publication is doubly devious in that the nom-de-plume selected is deliberately intended to appear as a real person. Who is "Nick Smythe"? Does "he" have vested interests in this controversy? Why does "he" have to hide behind false names? ("His" interpretation of events certainly suggests a pro-Poly involvement and I understand Polycorp intends to use the article for commercial gain.)

The professional integrity of your profession is therefore under question. So to the "heap of scrambling bodies" mentioned previously, your readers now should add "the media".

In July 1981, Polycorp distributed a document titled "Introducing the Polycorp Microcomputer Learning System". To most of us in the industry, this document came as a complete surprise. It contained grossly inaccurate statements that influenced the industry into a united attack against the policies proposed in this document.

Although claims were made that we were "a multi-national clobbering machine down trodding Kiwi inventiveness", the opposite was the case. All the companies that actively fought for what we saw as a democratic right to a free enterprise selection by tender were small New Zealand companies with limited financial resources and tight cash flows. Conversely, Polycorp had secretly established this project under the code name of "Polywog"; it had obtained substantial political support from the Minister of Education; over \$1 million of taxpayers' funds had been invested via the DFC quango; and within a few weeks (August 1981) the Cabinet was expected to approve more than \$10 million to finance Poly computers in schools.

I was appointed chairman of an MIA sub-committee to seek the right to a free tender system for this contract under the traditional methods of selection by the State Services Commission.

Space does not allow a full commentary of the detailed events that occurred at this time. MIA's main direction of attack could be summarised as follows:

1. Claims that the Poly computer was unique and that "imported (or alternative) machines were dated and locally irrelevant" had to be challenged.
2. With point 1 established, to convince the minister and the DFC they had been misguided by at best, over-enthusiastic and naive proponents of the "Polywog" project.
3. To highlight distressing and irregular matters occurring about that time which cast serious doubts on the impartiality of key government departments.  
For instance:
  - a. One MIA member (David Reid Data Products) had become aware of "Polywog" and corresponded with the DFC on November 5, 1980 expressing a strong interest in becoming involved and concern that it had not been included in discussions. The letter was not acknowledged until April 21, 1981

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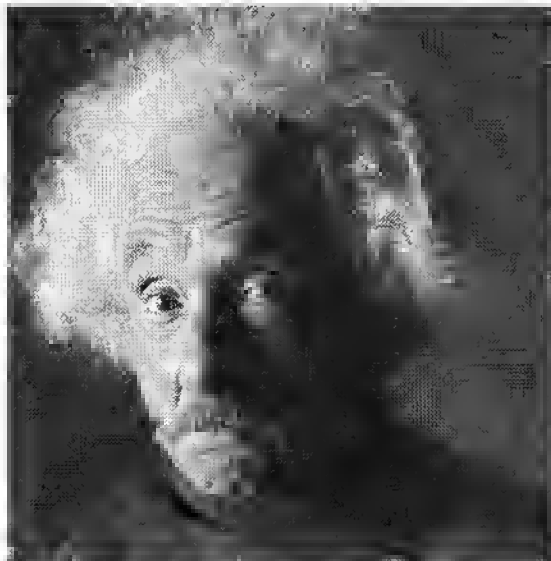


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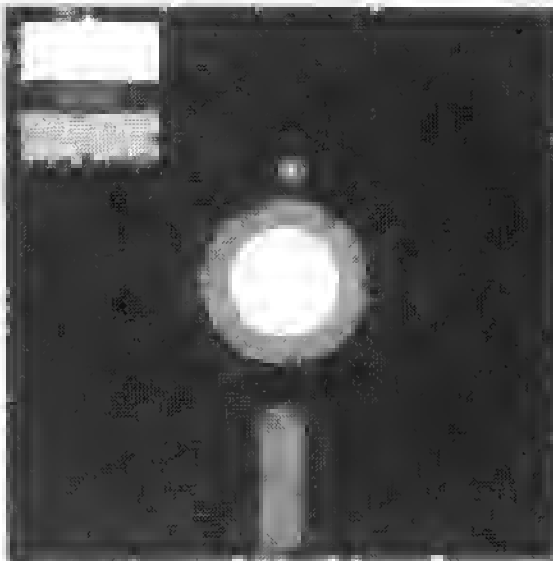
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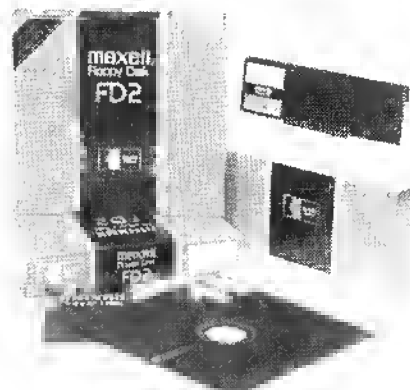
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# COMPUTERS IN SCHOOLS

with the opening comment, "During a recent clear-up of our office files we found that the attached letter had been misplaced . . ."

b. The senior technical adviser on microcomputers to the Department of Education was functioning in an active sales role for Polycorp. It was clear to us that this person would be an obvious member of any evaluation team if indeed we were successful in achieving this. He had to be removed.

c. There was widespread propaganda that it was Poly versus the overseas internationals. In fact, the four companies that most actively fought for a "fair go" in this business were Zylab, CED, David Reid Data Products and MDL — all New Zealand companies which had established existing microcomputer hardware manufacturing facilities in New Zealand.

d. The DFC was investing \$1-2 million into a high technology venture. This was unprecedented in New Zealand. By comparison, the Government has this year allocated \$1 million for research and development investment in New Zealand. New Zealand high technology companies can individually expect to receive at best five per cent of this funding in the current year.

e. Not a single New Zealand company with an existing investment in the microcomputer industry had been approached by the DFC.

It was clear to us that Polycorp (jointly owned by DFC and Progeni at that time) considered it had arranged a one horse race with a \$30 million prize for the taking (over \$10 million in hardware with the balance in courseware development . . . quote Minister of Education).

The events that then unfolded were predominantly due to steps taken by the minister and Department of Education to correct the unfairness then existing and to ensure the democratic procedures asked for by the MIA were met.

In due course, a "request for information" was sent out by the computer services division of the State Services Commission — the first step towards reaching the Department of Education's stated objective to achieve "standardisation on one make, model and operating system". From this, a short list of eight companies was asked to further submit hardware for evaluation.

At no stage was the question of courseware under consideration. The department had already made the decision that any existing courseware in New Zealand was of poor and inferior quality and that the department itself would prepare its own courseware on the standardised machine.

For the first time, a fair comparative evaluation would be made of the Poly

against other machines. The members of the evaluation team were unknown to the MIA but we had concern that some members would be seconded from the department to the evaluation team. Polycorp made no secret of its policy of employing department staff for various functions such as software development and we had grave fears that department technical officers who had been observed in an active marketing role on the Poly computer would also be appointed to the evaluation team (hence MDL's strong insistence on confidentiality from Polycorp's full or part time staff!).

By Christmas 1982, the evaluation was complete. Each of the eight (no one then publicly knew there were eight) finalists had been allowed to see its own survey results (MDL had an almost perfect score! We were elated). At the last minute, approval from the individual companies was obtained to include pricing information — we waited expectantly for the official announcement. You can imagine our dismay when not one company was selected, but five!

No matter how you manipulate the now public results of the evaluation team, there are two outstanding points that cannot be altered:

- The BMC colour graphics system with the locally designed and built MX computer was the clear winner.
- The Poly computer came fifth (or thereabouts).

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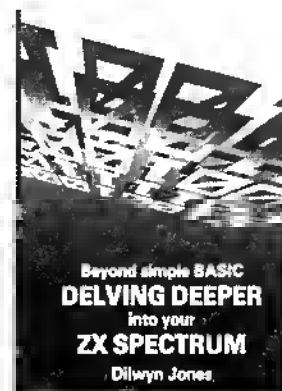
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# COMPUTERS IN SCHOOLS

By allocating seven, five and three points to a three, two or one star rating, and four points for each of the networking features implemented, you arrive at a maximum possible score of 95 points. Allow a further five, three, one points for "reliability during tests" for a maximum score of 100.

The results are then:

Computer	Score Max. 100	Price for 10-unit network
BMC800	99	\$29,800
Apple	76	\$37,230
NEC	72	\$41,560,000
BBC	60	\$32,973
Poly	55	\$44,837
Monroe	41	\$44,515
Hitachi	31	\$38,347
TRS80 (mono-chrome)	13	\$28,260

Note: The BMC price includes 10 dot matrix printers.

You can twist and turn the results as much as you like but you cannot change the fact that BMC was the clear winner by a very wide margin and Poly was well down the list.

Another factor not taken into consideration was the built-in 80 column dot matrix printer on each BMC800 included in our price and the fact the BMC was by far the least expensive.

You may well puzzle as we did as to why five machines were selected — remember the original specification "standardisation on one make."

The results from Polycorp's point of view were disastrous. The \$1-2 million dollar investment by the DFC was on the rocks and Polycorp's claims of superiority and uniqueness of hardware had been disproved.

The results are even more surprising when it is realised that the original specification was loaded in favour of Polycorp. Requirements for 14 inch screens and eight inch floppy disk drives were unnecessary and unfair. I can only assume they were recognised for what they were by the evaluation team and ignored.

At MDL, we knew we had a perfect score (all companies saw their own results but not the results of their competitors). When five successful companies were announced, we naively assumed the other four had similar results. It was not until the release of the full report that we realised the extent of the political interference and how one clear winner became five.

The non-release of the detailed evaluation to schools caused surprise and dismay to MIA members. We knew the report was ready for release on Christmas Eve — we had individually been consulted on pricing details.

Unknown to us and in spite of our own strong insistence on confidentiality against Polycorp, a copy of the detailed results was obtained by Polycorp. (Reference: Television Close Up, *Bits & Bytes*). It has amazed me ever since that this grave breach of security on commercial confidentiality has never been fully investigated. The department

## BITS & BYTES replies No apology is needed

Yes, "Nick Smythe" is a pen name. It is used because the writer might face recriminations in his employment if "he" wrote under "his" own name.

The use of pen names has a long and honourable tradition in English journalism and literature. Mark Twain is perhaps the most famous, but there have been many others.

Bits and Bytes stands fully behind "Nick Smythe" as a person of integrity, a person of knowledge, and a person of considered judgment. As we say in every magazine, the opinions of our contributors are not necessarily our own, but we are adamant both about their right to have informed opinions and about our democratic right to print these opinions. Nor do we deny those affected the chance to put their cases.

In the June Bits & Bytes and in this issue we put facts, interpretations, opinions, and counter-interpretations before our readers. We have the confidence that as rational people, they will be well able to sift the facts from the chaff.

— The Editor

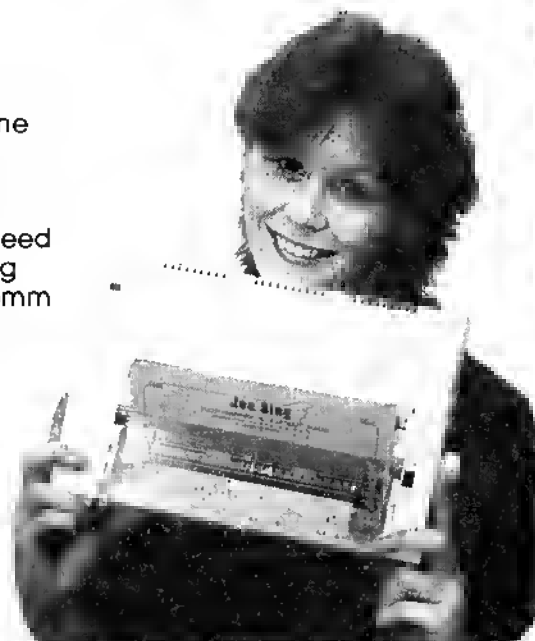
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# COMPUTERS IN SCHOOLS

later used commercial security as an excuse for not releasing the report. However, from MDL's point of view, the horse had already bolted and the gate had been opened, presumably by the Department of Education. We saw a potential \$5-10 million contract with a high New Zealand content disappearing down the road after being fairly and squarely won by our company.

MDL entered into an exchange of letters with the Minister of Education during the first six months of 1983 to endeavour to have either the full report or alternatively our own results released to the schools — all without success. This was before the "Freedom of Information" Act became law.

Our understanding is that under threat of legal action from one company, the department decided not to release the details of the report.

Polycorp countered the bad publicity it was now receiving with a comparative report compiled by one of its directors and some most outrageous statements were made — "an outstanding degree of co-operation from its four rivals in putting the document together etc." The Poly report was full of malice and grossly incorrect.

Polycorp had seen the department's report and would have known our price on the BMC unit was \$29,800 yet it reported our price to the schools as \$77,000. It also claimed we had no networking when it knew we had commercial networking systems throughout New Zealand and indeed we were then and are now the leading company in New Zealand on networking.

Polycorp discredited the star network system we use on the BMC800 by arguments that apply only to a multi-drop network as used on the Poly. It is worth noting MDL now offers both star and multi-drop systems. The speed of our multi-drop is 450,000 BPS compared with a Poly networking of 82,000 BPS.

The Poly report was exceedingly damaging to MDL. We are still correcting the misleading and incorrect information. Your correspondent, "Nick Smythe", is no exception. "He" makes the incredible statement that we had an "exceedingly slow and inflexible system" when our network system outperformed all others. (Ref: SSC Report). "Nick Smythe" obviously has never seen our network and has fallen into the trap of believing information in a biased, highly misleading and dishonest document while ignoring the SSC Report prepared by independent experts.

Auckland Grammar, Hamilton Boys' High School and King's College have had the expertise and experience to carry out their own evaluation and chose our system. Although we have since developed even higher speed networks for tertiary education, (which are creating world-wide interest), these schools have our original network system as proposed to the department in October, 1982. If your readers are in doubt, I suggest they contact these

schools for an independent opinion.

Both CED (Apple) and MDL (BMC) entered into legal proceedings against Polycorp over its report. In our case, we allowed the action to lapse, not because of any doubt over a successful outcome but because the estimated cost of legal fees in the High Court was \$80,000 — well beyond the financial resources available to MDL.

Over the 18 months since the release of the infamous "famous five" document, the installation of computers has proceeded in a haphazard and largely misguided manner. Lacking finance and expert guidance, schools have tended to purchase on the basis of maximum screens for minimum dollars.

The DFC has opted out of Polycorp shareholding and publicly admitted it would never have become involved had it known what it now knows. (Ref: Smith-DFC, Television Close Up).

The Government withdrew from any commitment to provide finance for schools and the Department of Education is yet to clearly define any policy.

Meanwhile, those "scrambling bodies" continue to bang heads with one another. I think it is time to blow the whistle.

And yes, you were wondering about the horse that bolted? — I am afraid it's long since dead!

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## Progeni/ Polycorp replies

I wish to comment upon Mr Lovelock's letter. Given his trenchant criticism of your journal and the 'Nick Smythe' article your readers could expect Mr Lovelock's letter to espouse the high journalistic standards he expects from others. Sadly, such is not the case, and his letter is emotive, factually incorrect and highly subjective.

Your readers are best left to judge both the issues and Mr Lovelock's letter (on its merits, or lack of them) for themselves. There are several points, however, of information which require correction.

Firstly, Mr Lovelock devotes much of his letter to the 'Schools Computer Report'. The best thing that can be said about this is to quote the disclaimer on the Circular, issued by the Director General of Education.

This document is a draft paper which forms part of the Department of Education's records. It was never issued and has no official standing. It should therefore not be relied on in purchasing micro-computers for schools or other educational institutions.

The draft paper is being released under the Official Information Act and is released without responsibility on the part of the Department of Education, the State Services Commission and officers of those departments."

Given this disclaimer Mr Lovelock's own arbitrarily constructed points table suffers from the GIGO principle — garbage in, garbage out.

Secondly, Mr Lovelock makes the following claim:

"... POLYCORP's claims of superiority and uniqueness of hardware were disproved."

Not so, the evaluation proved nothing, and the final and definitive answer on this one is POLY's own success, particularly in education and training. POLY's uniqueness, superiority and cost effectiveness as a learning system has been resoundingly proven by the Australian Department of Defence procurement. This export business is worth \$.75 million to the New Zealand economy.

It is particularly relevant to note that POLY won this against intense international competition involving 42 bidders. The magnitude of this

success alone vindicates all those New Zealanders who have supported POLY.

POLY has also been accorded the highly sought distinction of selection by Chinese educationalists and trainers. Despite the whole debacle POLY is enjoying continued and growing support in the New Zealand marketplace.

Thirdly, Mr Lovelock alleges: "a grave break of security on commercial confidentiality" in relation to the events surrounding the original release of evaluation results to POLYCORP. This is incorrect. In 1982 we sought the information to be published, on a daily basis, and we were advised when it was ready for mailing. We collected a copy of the "Circular", as any other participant could have done, and as a result of our well-founded comments the Circular was withdrawn by the Department. We were persuaded to return our copies on the assurance that a competent report would be issued. The rest is now history.

Fourthly, Mr Lovelock alleges that a report prepared by POLYCORP and circulated to schools was, to quote, "full of malice and grossly incorrect". He then goes on to claim that various legal proceedings were entered into against POLYCORP, presumably to support his allegation.

It must be clearly stated that there is no litigation against POLYCROP, nor has POLYCROP entered into any out-of-court financial settlement. So much for the creditability of Mr Lovelock's allegations.

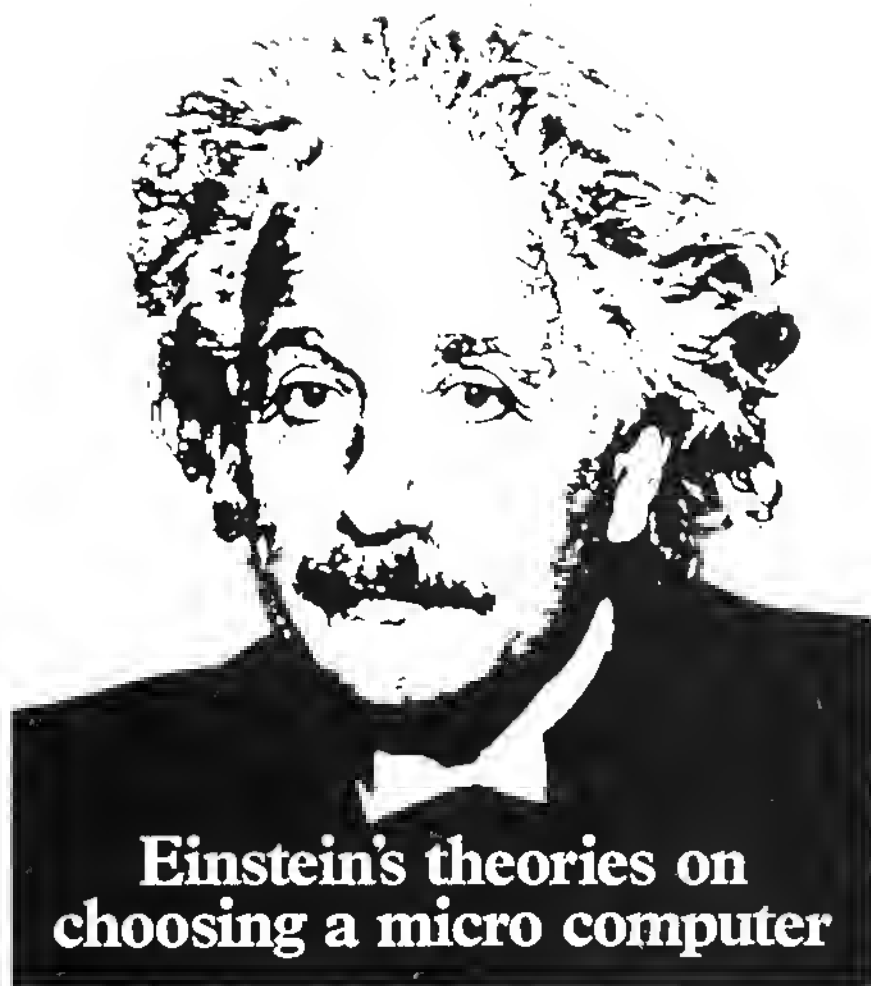
The POLY project was a fine New Zealand initiative openly and properly undertaken to maximise the benefits for New Zealand of the introduction of microcomputer technology in education. In spite of all the rhetoric and all the fuss POLY continues to succeed both here and internationally.

Sorry Mr Lovelock, POLY is alive  
... and kicking.

Yours sincerely,  
POLYCORP. (NZ) LTD

R.J. Greenbank  
General Manager

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## Einstein's theories on choosing a micro computer

**C**hoosing a micro is a daunting task for the new-comer and with an ever increasing number of micro's emerging in the New Zealand market. Even up-grading, say, from a ZX81 can be a risky and expensive exercise with the wrong decisions made. At Einstein Scientific Ltd, we believe it is important to look at the real facts and specifications, and check exactly what you get for your money before choosing your micro computer system.

### THE PIT-FALLS.

#### Don't buy a games machine.

Unless you want games and nothing else! With a games computer you are limited. Some computers, however, have the advantage of both games facility plus the whole world of computing to explore as your interest and skills develop. A real computer system will allow you to expand your knowledge of the high technology world, and help earn its keep with its varied uses in the field of education, home, business use and communication.

#### Software.

Make sure the system you choose has a growing library of support software, to enable you to realise the full potential of your machine.

#### Check the quality of the product.

Low quality components and bad design will seriously affect the reliability of the end product, and lead to false economy. Watch out for unreliable edge connectors, corrosion and poor PCBs. Make sure that your supplier can provide an after sales service in case of product failure.

#### Don't let the add-ons add up.

A number of outlets are offering packages that seem to be good value at low cost. Unfortunately these offers have a hidden sting in as much as the essential accessories such as power supply, peripherals and

software often carry a very high cost premium. Make sure you get an 'all-in' price to enable you to start operating the system. Software for low cost hardware usually costs between \$50 and \$100 for a ROM cartridge.

### KEY POINTS TO LOOK FOR.

#### Computer language.

Is it too difficult to programme a computer in its binary language so high level languages are used, the most popular being BASIC. However, there are a number of basics, some being very different from the rest. A de facto standard in the computer industry is Microsoft BASIC. Learn this and you will be able to programme in the majority of computer basics; such an important point if the home computer is to be used to educate your children to face the technology of the future.

#### Expansion.

As your interest and knowledge of computing grows you will need a computer system that will grow with you, able to accommodate printer, disk drive, joystick, communication modem and colour monitor as well as produce Hi-Fi sound effects.

#### Software.

The computer you choose should have a growing selection of utility software to make the most of its capabilities. Remember, computing is here to stay. You can't learn to compute on a toy or a device that does not behave like a real computer.

#### High resolution colour.

In general most home computers have a poor graphics resolution (or detail). Check on the vertical and horizontal resolution in graphic mode and multiply the two numbers together — if the result is less than 35,000, then the graphics can hardly be considered high resolution. Low resolution graphics displays, such as those used in games, tend to fit "chunky" in appearance.

#### Keyboard.

For accurate entry of programmes and data into a computer it is important that the keyboard has a good tactile feel and operation. A standard computer keyboard layout will familiarise the user with the vast majority of computers which are used in the world of business and professional applications, very important if the purpose of purchasing the computer is educational.

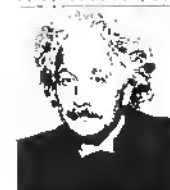
#### RAM (Random Access Memory).

One of the most important features of a computer is the amount of RAM, or memory included. In general, the more powerful and exacting a computer program, the more RAM it requires. But take care, all computers are advertised quoting the total RAM used in the system. Computers use up a great deal of their own RAM for storing essential data, in particular supporting the graphics display and the CPU (Central processing unit). If it is less than 32K, think again, is it enough?

In short look out for a computer which offers all the points above and you will be sure of getting good value for money.

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# COMPUTERS IN SCHOOLS

## More on the evaluation

By Nick Smythe

Last month we noted that during the evaluation of computers for schools a summary report of the full report was written ready for distribution to schools and was shown to a commercial interest before being withheld from circulation: this document has now come to light... no fewer than two people have already shown me copies.

The great surprise is that the summary report turns out to be longer than the original report.

The report is dated November 30, 1982, and consists of 21 pages fronted by a circular letter to schools and regional superintendents of education. It has all the appearance of imminent release. In general, it follows the line of the main report (warts and all), but with additional caveats on the BMC800 and network capabilities in general. Arrangements had been set up for purchase through the Stores Board of the Education Department.

In terms of what schools would have been told three things stand out.

1: The concept of language standardisation is firmly endorsed and schools are promised the specifications of a software standard with the promise that "this task is being undertaken immediately" and will meet the needs of "all machines with minor adaptations". Has anyone seen this document yet, and can the latter claim be substantiated?

2: The software standard is proposed as a basis for future evaluation of new machines and an undertaking is made to review and update and enlarge departmental recommendations against this standard and the original hardware specifications. There seems to have been silence on this point.

3: The "summary" contains full, if inaccurate, comments on each of the five recommended machines, plus the prices quoted by distributors. In the copies I have seen all this information has been released in full... except the quotations provided by CED Distributors on the

Apple II which have been suppressed on the grounds of "commercial sensitivity". I imagine the other four suppliers are wondering why Apple prices alone are deemed to be sensitive.

I daresay someone will continue to try to get this last piece of information, just for the sake of completeness. Meanwhile, the questions still remain about the delayed release of the report. Why was it held back? Certainly it is hard to see any remaining credibility in the original reasons given, for the summary report demolishes these further.

## First Australian-made IBM PCs shipped

The first Australian-made models of the IBM Personal Computer and PC-XT were shipped from the company's plant in Wangaratta, Victoria, on 7 June.

Shipments started a month ahead of the original schedule.

Initial production of both PC models is for the Australian market, with exports to New Zealand and south east Asian markets scheduled to begin later this year.

All IBM Personal Computers for the Australian market will now be produced in Wangaratta, which becomes the third IBM plant in the world to manufacture this highly successful product.

The Wangaratta plant has been assembling Selectric typewriters since 1976. These will be phased out by September of this year as PC production is phased in. Typewriters will continue to be supplied from overseas plants.

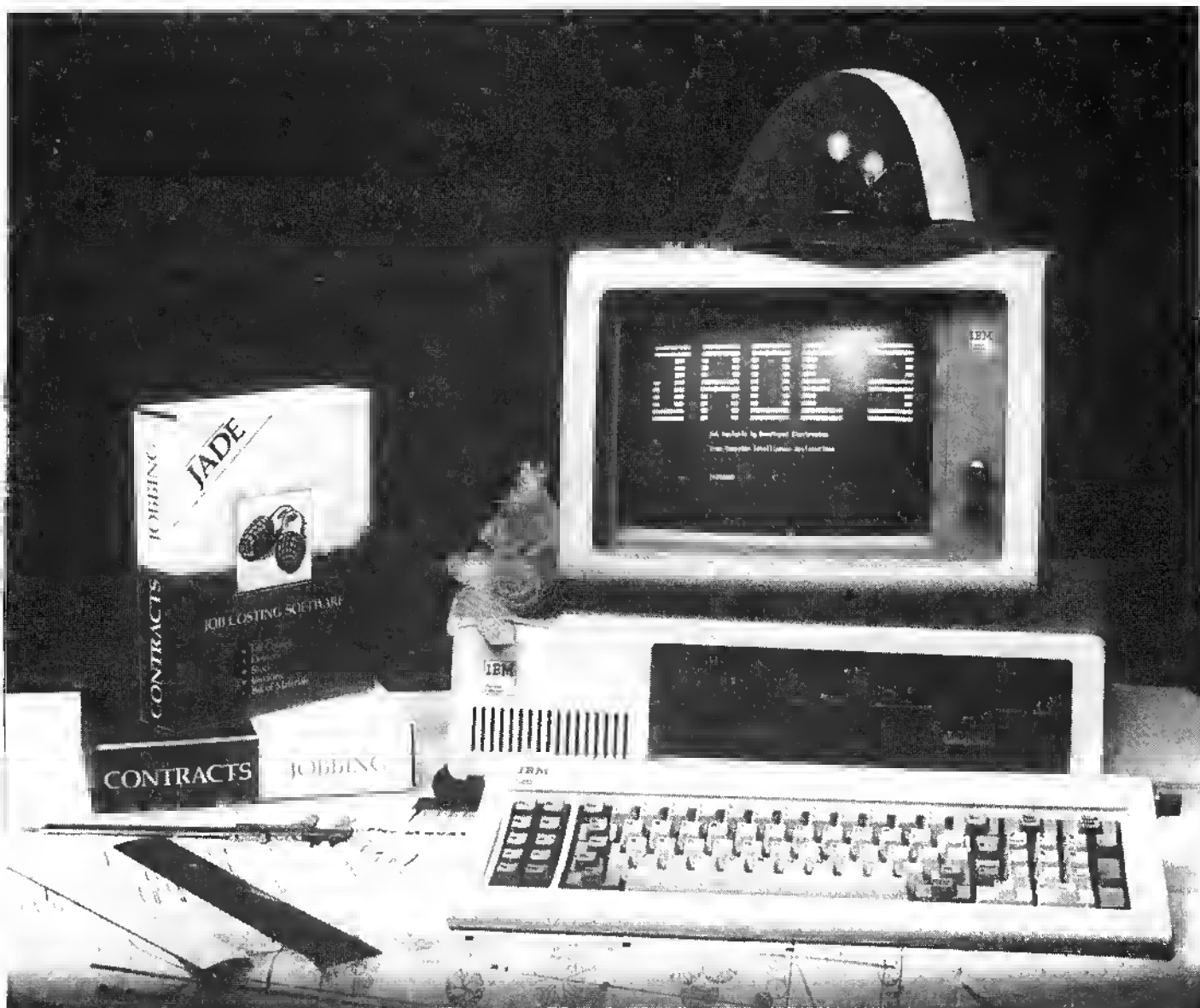
## New software

The Software Shop has been established in Auckland to distribute main line software to dealers in the North Island.

The company has arrangements with several overseas companies, enabling it to offer a two-week delivery date, and it has exclusive rights with some major software companies.

Director, Quentin Miller says the company was established because of the belief prices for software in this country are too high.

It can offer popular software at prices generally cheaper than currently available in New Zealand. The range includes both games and business software, and catalogues are available from: P.O. Box 1057, Auckland.



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System requirements: 128K RAM, DOS (any version), one disk drive or hard disk



# Research head tells what's coming up

By Pat Churchill

The technologies that developed the motor-car, the telephone, and television went through four stages.

They started as laboratory curiosities. They then became exotic tools or toys possessed by a very small number of people. In the third stage, they became well known, widely written about, but still far from pervasive and were owned and used by only a few per cent of the population. In the fourth stage, they became completely pervasive.

Computers are following the same path and will reach stage four during the next couple of decades, according to John L. Doyle, vice-president for research and development for the Hewlett-Packard Company, who visited New Zealand recently.

In a presentation given in Wellington, Mr Doyle said that when computers reached stage four, they would expand the human memory, augment human reasoning, and facilitate human communication. They would do this in useful, entertaining, and pleasant ways. "They're going to become domesticated."

In a recent wander around his home, he counted 27 computers, all hidden and all working nicely, elegantly, unobtrusively.

"I also have 37 electric motors in my home and three-quarters of them

will be replaced by computers." The only reason they hadn't been, was that the house was about 15 years old and all appliances were the original ones.

The microprocessor was, undoubtedly, a computer and hundreds of these were being used effortlessly today.

Mr Doyle foresees table-top computers becoming as easy to use as "the ones you don't even know about around you today."

"The computers we are talking about are going to be very nice, very



John Doyle

effective, and also ubiquitous." It took programs to provide that kind of ubiquity, "and programming today is about as much fun as climbing into the cage of the circus lion."

But there were people who liked taming computers, just as there were lion-tamers. There were people completely comfortable with computers, who had grown up with them. But they were also not terribly intelligible when talking to people who had not grown up with computers, and they had difficulty

understanding the mental processes of older people.

"So programming isn't much fun, and what we've got to try to do is get programming to be fun."

## KEY CHALLENGES OUTLINED

Mr Doyle said he saw three key challenges of the fourth stage: "We must mask the complexity of the internal operation of the computer and raise the level of abstraction with which we deal with these machines.

"Software has got to be adaptable to use, and you've got to be able to re-use the application solutions that have been developed in different places.

"And vast improvements in cost ratios and programming productivity are going to be required to achieve these ends. Those vast improvements in cost performance of hardware are completely predictable. The vast improvements in programming productivity are somewhat more debatable these days."

What was needed to make friendly computers was an enormous increase in their computational speed and available memory, and a similar increase in the band-width of communication advance, he said.

"A computer without a large memory is like a car that has no oil. And a computer without a rich applications memory is like a car with no fuel. Both these things need to come to pass for us to be able to reach this domestication stage."

Mr Doyle said that in HP Labs, and in production in Hewlett-Packard, "we're operating at about one and a quarter micron spacing. And we have transistors on a chip that vary from 452,000 to 680,000 depending on whether you're talking

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## PEOPLE

# Crusader for PILOT language

By Pat Churchill

Wellington's Jenny Chisholm, of Classroom Computers, is a woman with a mission. She believes PILOT is an ideal computer language for use in primary schools and has been circulating all such schools from Wellington to Waikanae, Marlborough, and the Wairarapa spreading the news.

In addition she has visited a number of schools to talk to staff meetings, training sessions and meetings of parents.

Mrs Chisholm, who trained as a secondary school teacher, and now teaches part-time, belonged to a group of families who bought Atari computers with Atari PILOT in early

1982. This computer language, which includes Turtle Graphics, is widely used in junior classrooms overseas.

The group's experiences led to the building up of a store of resource material, teaching experience and lesson procedures. This is the knowledge Mrs Chisholm is now seeking to share with primary schools, particularly those beginning to think about buying computers.

She describes it as "a bit of a crusade."

Of her personal contact with computers, she said, "BASIC turned me off completely. As soon as I got PILOT everything was so clear and similar to English."

She felt that many more people in primary schools would take to programming in PILOT than in BASIC. "It is very quick and very easy, but it is a very powerful language that can be used right up to university level."

In her school demonstrations, she has found teachers interested in watching how those pupils who are

not big achievers respond positively to their computer experience. "These children don't mind sticking at a problem in search of a solution. No-one shouts at them if they get it wrong."

An Atari version of LOGO is also available now, and Mrs Chisholm is working on becoming proficient in this.

"I taught myself PILOT no trouble. I'm not so sure about LOGO." Along with a number of other Wellingtonians, she has been taking night classes at Wellington High School in LOGO.

What does she feel school pupils will get out of PILOT and LOGO?

"They can teach the computer something. They can learn how to solve problems. For instance, they can learn to draw a square and a triangle and then solve how to put them together in the right position to make a picture of a house."

Mrs Chisholm has an Atari agency, an involvement that stemmed from her association with the original group.

about irregular configurations or nice regular ones like memory. HP Labs is the place where I work and we are down in the submicron world now, and we can see getting to a half-micron by the end of '88 quite comfortably."

But speed, not just density, is wanted. Mr Doyle gave his guess at the way technologies would evolve: "In 1985, getting on towards a million switches on a chip; different technologies will take us from complexities of approximately a million and speeds approaching a hundred gigaHertz by 1985."

More software writers would be needed. They would be there, Mr Doyle predicted, because software productivity would be enhanced and it would be more fun to write software.

## MACHINE COMMANDS IN ENGLISH

"The video games people are leading the work in this enhanced-software productivity. They're experimenting with joysticks, naturalness, reasonable forms of interaction: the mouse, the touch screen, voice, and natural language."

"Experimentally, in the lab, it's perfectly possible now to talk to a machine in English and have it do what you wish it to."

But this was a few years away from commercial productivity, "because it needs us to get further down the hardware capability. But it's not really difficult to do."

Mr Doyle said there would be a transition from the competence functions of computers (computer-

aided design, computer-aided test, word processing and spreadsheet activity) to computer-aided work (document generation, voice annotated drawings, drawings that could be created, edited and distributed reasonably effortlessly, computer-aided analysis, and computer-aided communication) and finally to computer-augmented or computer-enhanced work where database availabilities were readily accessible, where archives could be called up from anywhere in the world, and where real power was available at the convenience of the thinker.

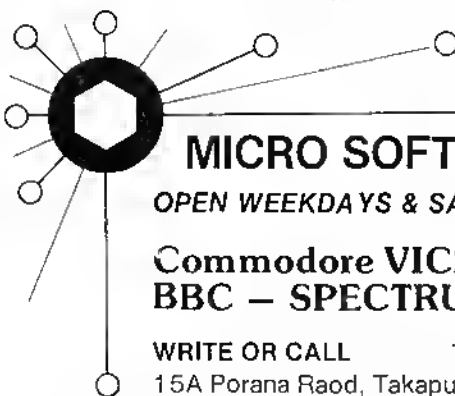
"Computers, the most ubiquitous tool yet devised by man, will, over the next few years, become the pervasive servant of every man," said Mr Doyle.

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## DISKS

### DISK DRIVES — 4

# How DOS keeps track of things

By Gerrit Bahlman

It's like this see, I've got this stuff stored on my computer disk. How do I get it off? I've tried Lux liquid and Janola — nothing seems to work. And the real problem is I don't remember exactly where I put the stuff anyway. Can you help me?

This might be a typical query in a disk-operationless world. Thankfully, there are such things as disk operating systems and they apply the Janola for you. You have to know the name of the "stuff" though. If you know the name of the file you want to access there is no need to know where on the disk it is kept. The software will do that job for you. You not only don't need to know where the file is, you don't

have to know how to get there. The vagaries of read/write head movements and disks, twirling at a dizzying pace, are not for you. You can relax. Just give the disk operating system the file name and order it to open the file. Aren't computers wonderful slaves. (How long until processor liberation?)

In an earlier article I mentioned the need to pass track and sector information to the disk drive. We now realise that that was a simplification. The disk operating system takes note of that information. All that it receives is the file name. It must determine where the file is and then make the disk read/write head move and the disk spin to get there. The details of the read/write head movement have been covered but how does the disk operating system know where the file is on the disk?

We know there is a directory on the disk. Sometimes it is called a catalogue, a directory, an index or whatever. Let us trace through the path that the software must follow to find a file.

First, a file X is required. The disk drive is turned on and the read/write head is moved to a special track on

the disk called the directory track. This always happens. There the file name is looked up and the position of the file is discovered. But, how is this done? What is on the directory track? How is it used? Where is the directory track to be found?

The directory track could be anywhere as long as it stays in the same place for a given operating system. The best place will be where subsequent movement to files is kept to a minimum. This is the reason the directory track is often placed right smack in the middle of the disk tracks. Subsequent movement will at most mean only half the disk will have to be traversed by the read/write head. On multiple read/write head disk systems where there is a read/write head above each track even that does not matter. But in floppy disk systems it would prove an advantage.

How is the directory organised? It may simply be a list of file names followed by a track and sector number. The file starts at that track and sector. At the end of the file a special pattern of bits signals "end of file". This would work, but there are complications. What if the first sector cannot store the whole file? Will the space following that sector fit the file? How will congestion be dealt with. You can be sure that most files will use more than one sector! Typically, files are measured in blocks. Block size may vary depending on the sort of files stored, whether the programmer has set a block size and so on. (COBOL allows block size to be altered.) Directory listings usually give the number of blocks that the file uses. Your computer will do this, either directly or with some additional full listing command. If we take the simple case where block size equals sector size, you will soon see how many sectors are being used.

## PACKING IN THE INFORMATION

So the simplest directory will have some very definite problems. What would happen if files were restricted to one block (sector) of information each? A mini-floppy holds about 600 sectors for single-density configurations. (The Apple has 560 using DOS 3.3.) There are a limited number of sectors on a track. Say around 16. Each sector might store 256 bytes (characters) so the number of files stored in the directory will be strictly limited! Taking a 16-character file

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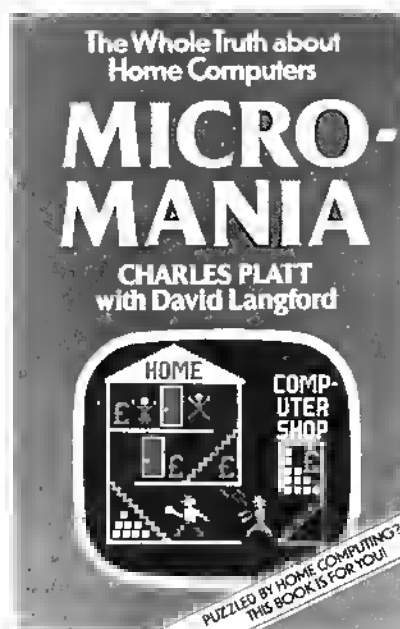
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- "Computer designers talk a lot about compatibility, but secretly they hate the idea of standardisation. It cramps their style."
- "No matter what they think they're going to use a computer for, most people end up playing video games."
- "The man who invests a lot in a system will swear by it in public, even if he swears at it in private."
- "When you get a computer to do a job for you, the time you save will usually be spent watching the computer to make sure it works properly."
- "No matter how expensive you expect a system to be, it will always end up being more expensive than you expect."
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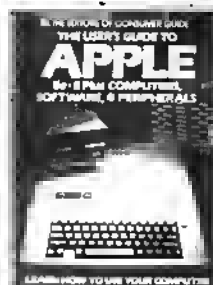
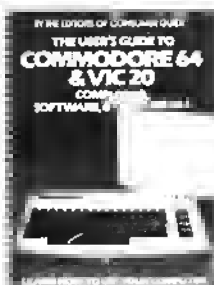
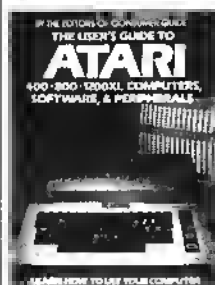
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Straightforward account of what computing is about, written in a style the non-technical reader can understand. The book outlines what a computer is capable of, and how its simple abilities build up to complex, real-life applications.

Penguin

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### Programming in Structured BASIC

Ronald Brinkman

Covers data and data types, arithmetic and simple string expressions, intrinsic functions, input and output, sequential processing and structured programming; essential data structures; one and two-dimensional arrays, and basic searching and sorting techniques.

Cellier Macmillan

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### Microsoft BASIC and its Files

Jacques Boisgontier & Suzanne Ropiequet

Handbook on programming techniques and a guide to data file programming. Reviews fundamentals of Microsoft BASIC programming language and provides more than 24 working programs as building blocks as you learn to design your own programs. Introduces data file programming principles and concepts, and discusses and compares random access and sequential files. Instruction on use of index files to access and sort file records. Lots of examples, programs and figures.

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### The Acorn Guide to the Electron

Neil & Peri Ciyet

Comprehensive tour around the Electron, packed with extending diagrams and graphics. Discusses hardware, software, running programs on the Electron, making your own programs, Electron BASIC, getting data in and out of programs, graphics, colour, coloured shapes, programmed characters, animation, sound, assembly language.

Penguin

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### Getting the Most From Your Sinclair Spectrum

Anne Sparrowhawk

Diagrams, colour photographs, programs, entertaining examples, informative appendices and a straightforward text takes you utterly and painlessly from the elements of computing to mastery of the Spectrum.

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### CP/M Database Management Systems

Carl Townsend

Compares 12 database management systems for CP/M.

based microcomputers, providing an overview with hints on installation, file creation, data retrieval, reporting and summary notes - along with the important advantages and disadvantages of each system. Part one introduces general database terms and concepts; part two examines the major CP/M database management systems.

dilithium Press

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### 1,2,3, Go!

Julie E. Bingham

Easy workout of the 1-2-3 program demonstrating the basis of the package, how to build a spreadsheet, how to create a graph, how to manage financial data collection, how to customise 1-2-3 to your business requirements. Well presented and plenty of examples.

Addison-Wesley

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### Tim Hartnell's Giant Book of Computer Games

More than 40 games compatible with Microsoft BASIC able to run on most micros, including BBC, VIC 20, Oric, Apple II and IIC, Commodore 64, Dragon 32, Tandy Color, IBM PC, Laser, TRS-80, PET, MZ80K and Spurtum. Range covers board, dice, space, brain and adventure games, simulations, artificial intelligence, and some just for fun.

Collins

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and earn 1 bonus point.**

### Advanced Programming Techniques for The Electron

Jim McGiegot & Alan Watt

Gets into the programming principles and techniques behind arcade games and character animation, data structures and databases, text processing, board games and the beginnings

## Games for Apple, C64, VIC-20

Three classy collections of games for three computers. Thrill to adventures in imaginary environments; test your reflexes in arcade-like games; pit your brain against the computer in hard-to-win board games; have a lot of fun improving your programming at the same time.

Editions for:

• Apple Rohan Cook & Tim Hartnell  
• Commodore 64 Robert Young & Paul Copeland

• Vic-20 Paul Copeland

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and earn 1 bonus point.**

of artificial intelligence. Emphasis is on applying these techniques in your own programs, with plenty of suggestions for refinements and developments of the material presented.

Addison-Wesley

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**and earn 3 bonus points.**

### Basic Systems Analysis (2nd ed)

Barry S. Lee

Sets out to give an overview of the knowledge and skills needed by a systems analyst. Assumes a basic understanding of computer technology, programming and data processing methods. Describes nature of data processing systems, looks at the analyst's job and the development stages of new computer-based systems.

Hutchinson

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and earn 2 bonus points.**

### Understanding dBase II

Alan Simpson

Clear, concise text and eye-catching graphics help you master the basics, then guide you through programming techniques for useful applications such as mailing label systems, graphics, bookkeeping, printing and formatting reports. You also learn to interface dBASE II with other software systems to extend its capabilities.

Sybox

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### Tim Hartnell's Giant Book of Spectrum Games

More than 80 programs covering just about every sort of genre imaginable - arcade action, mind menders, chance and skill, adventure, space, board and word, fun, simulations. And there are utility and demonstration programs, games to convert notes on error trapping and a glossary.

Collins

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and earn 1 bonus point.**

### Games and other Programs for the Acorn Electron

A mix of competitive action, dexterity, imagination, judgement and skill in a collection of 20 colourful programs. And "program rescue" programs are provided to help you put those games, colour graphics and sound programs on tape. One for arcade fanatics and those who prefer to develop thinking skills.

Penguin

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### Fundamentals of Computing

Neil A. Sheldon

Intended to provide a grasp of fundamental principles by which digital computers work, concentrating on the concepts necessary for an understanding of all computer technology. Deals with how computers store and manipulate binary data, the facilities a computer system must have to store large quantities of data and communicate with users; the functions and organisation of processors and how they communicate with the rest of the hardware; and the software required to make a computer an efficient tool.

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### Working Smart: How to Use Microcomputers to Do Useful Work

Colin K. Mick

Sets out to answer two questions: "What's right for me?" for the prospective user, and "How can I get the most out of this?" for the experienced user. Jargon-free guide to hardware and software gives a component-by-component description of how computers work, and explains software programs for word processing, financial analysis, filing, database management, accounting and other special purposes. There's also a six-step buying strategy, operating tips, trouble-shooting methods, and a big glossary.

Cellier Macmillan

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and earn 5 bonus points.**

## Commodore

Basic Subroutines for Commodore Computers  
Eddie Adams

Easy-to-use manual which offers access to more than 300 BASIC subroutines — powerful building blocks you can combine and adapt to create programs for a wide range of business, educational and personal applications. Explanations for each subroutine with suggestions for modifying it to your needs. Each program is ready to run on any Commodore system.

Wiley &amp; Sons

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and earn 3 bonus points.

## How to Use The Commodore 64

Jerry &  
Deborah Willis

Introduction to the computer, its parts, its operation. Explains what the components do and how they work. Further step-by-step instructions in setting up and installation. Shows how to load and save programs on disks or in cassette. Includes how to type in, use, and modify programs. Includes other sources of information.

Dorland Press

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and earn 1 bonus point.

## Challenging Games for the Commodore 64

William A. Roberts

Just about everything — enemy blasters, outwit the computers, shoot-outs. All 18 are designed for excitement from Caverns of Terror and Tunnels of Thar to Warlock's Castle and Blockout.

Pitman

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and earn 1 bonus point.

## How to Program the Commodore 64 — If you've never programmed a computer before

Robert Young

After an introduction to the bits and pieces of the 64, you move to the process of learning to program on the keyboard. Concentrates on the key words and techniques to have you writing programs as quickly as possible, then allow you to refine the process at your leisure.

Interface

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and earn 2 bonus points.

## Basic Commodore 64 BASIC

James S. Coan

An easy-to-read guide to computer operation and BASIC programming. Simple, direct approach involves mastering short programs, then adding a new command and watching as the program is created and illustrated. You then move on to another capability. Programs are divided into manageable segments, and special features and advanced programming techniques are explained.

Hayden

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and earn 3 bonus points.

## Blast Off With BASIC Games for Your Commodore 64

David D. Busch

Twenty-five ready-to-run games designed for both fun and learning. You can enter and run programs without having to know the finer points of BASIC language. While at the same time, learning BASIC programming skills. Nine games are arcade-style, the others use graphics, sound and keyboard control.

Brady

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and earn 2 bonus points.

## Commodore 64 Data Files: A Basic Tutorial

David Miller

From-the-beginning guide to creating your own files, offering valuable techniques and shortcuts for the advanced computer programmer. Program examples from home, hobbies, business, education and investments.

Reston

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and earn 3 bonus points.

## Commodore 64 Subroutine Cookbook

David D. Busch

Poison of machine-specific subroutines to help improve your programming expertise. Includes 70 ready-to-merge subroutines plus programming tips. Subroutines are ingredients for programming practice and learning and are complete with line-by-line descriptions.

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## Conquering the Commodore 64 Kingdom

Bill L. Behrendt

Twenty-five original graphics games

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## Business

## Introduction to Computer-Based Accounting with applications for Apple II, TRS-80, Commodore PET

Wennie van Lint, Allan Miller &amp; Brian Belcher

After introducing computers and BASIC language, there is an up-to-date presentation of accounting topics, partial listing of programs for practice completion and problems which can be run to accompany the book.

Prentice-Hall

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and earn 1 bonus point.

## On-Line Computing for Small Businesses — Silver's Wall

Maurice A. Silver, John Jeacocke &amp; Ray Welland

Sets out to provide managers of small businesses with a clear, concise but non-technical instruction in the use of online computing based on the practical experience of the authors. No prior knowledge of computing assumed and only essential technical definitions are included.

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## Does Your Small Business Need a Computer?

Martha Eischen

Guide to deciding if you really need a computer and how to set up a feasibility study to see if computerization will help your business and if so, what. Advice on how much computing power you need, what the system should cost, how to choose the right hardware and software, whether or not you need an outside consultant, choosing a system to meet present and future workload, how to install the system and the least possible disruption.

TAB

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## Choosing Your First Computer System: A Guide for the Growing Business

K. Ian Mitchell &amp; Bevan J. Clarke

Written to help the manager with no computer experience to decide whether the business needs a computer and if so, which one, what sort of computer services will be best, and how to manage selection and installation. Straightforward style helps remove the complexity from these problems.

Pitman

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## Keyboarding

## Quick Keyboarding

Vonnice Alexander

Sub-titled "Competent Keyboarding in 6 Hours", this book by New Zealand Vonnice Alexander has a unique method for teaching yourself competent keyboarding. A wall chart of finger positions is included.

Methuen

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and earn 1 bonus point.

## Keyboarding for Information Processing

Robert Hanson

Enables a person to develop basic touch keyboarding skill in a minimum time. The person who completes the book will be able to key in alphabetic, numeric and symbol information; input numbers on a separate 10-key pad; keyboard information quickly and accurately; understand some of the basic vocabulary used in keyboarding. Can be used for classroom or individual, self-instruction.

Osborne-McGraw-Hill

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and earn 1 bonus point.

## Basic Keyboarding

Catherine Gibson &amp; Tod Carter

Exercises designed to develop basic keyboarding skills and techniques. Can serve as an introduction to keyboarding for the computer, word processor and as a first step to typing. Equally suitable for the classroom or as a self-instruction course.

Pitman

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and earn 1 bonus point.

## VIC

## The VIC-20 Connection

James W. Coffron

Shows how easily you can use the VIC along with household devices. Outlined techniques for using the computer to control a home security system, a home temperature system, a voice mail system to move the computer fax. The VIC is well suited for connecting to non-computer devices and this book provides in-depth ideas and with the knowledge of what to do.

Sams

Our price \$17.05. Save 90 cents  
and earn 1 bonus point.

## Getting Acquainted With Your VIC-20

Tim Hartnell

Contains more than 60 games arranged to lead you, step by step, through most of the VIC's commands and statements. Each program is accompanied by an explanation and hints on how to get the best from it.

Interface

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and earn 2 bonus points.

## Blast off with BASIC Games for Your VIC-20

David D. Busch

Twenty-five, ready-to-run games for both fun and learning. You can enter and run programs without having to learn the finer points of BASIC programming. While at the same time, the book teaches these skills. Nine games are arcade style, the others use graphics, sound and keyboard control. Flowcharts show you how to draw each game and how each program is written.

Brady

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and earn 2 bonus points.

## Zap, Pow, Boom: 30 Games for your VIC 20

Mark Rainshaw

Arcade games covering space, mazes, wars, narrations, driving, dragons.

Pitman

Our price \$26.35. Save \$1.40  
and earn 2 bonus points.

## General

## The Computer Book: An Introduction to Computers and Computing

Robin Bradbeer, Peter de Bono &amp; Peter Laurie

The book which has taken Britain by storm. Written for the lay person in plain English to explain what computers can do, how and why they were developed, and how they work. Looks at problem solving, provides an introduction to programming, explores how the micro can be used as tool in many areas, and looks into crystal ball about the direction and limitations of this technological revolution.

BBC

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and earn 2 bonus points.

## Matilda, the Computer Cat

Calire Bailey Passantino

One for the kids who can follow Matilda's predicaments and adventures — everything from lost kitten mittens to chasing mice for dinner — all taking place on the computer screen. Story unfolds through bit-sized programs and activities, accompanied

by programming hints, and suggestions for parents and teachers.

Pitman

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and earn 1 bonus point.

## What To Do When You Get Your Hands on a Microcomputer

Charles P. Holtzman

Easy-to-read, fun introduction to computer programming. Suitable for any age, it's written in a crisp, lively format using cartoon-type drawings to explain the BASIC language and show how it can be used on any small computer. Also includes advanced information on compilers. Tips on planning a career in computing and tongue-in-cheek advice on how to get the best from your computer, programs and programs of efforts.

IA9

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and earn 2 bonus points.

## Basic Computer Simulation

Lawrence L. McNitt

Sourcebook which takes you through the specifics of modelling and creating simulations, and provides a broad range of sample programs in BASIC for use on any computer. Sixty-one programs on which to practice and learn.

TAB

Our price \$32.25. Save \$1.70  
and earn 3 bonus points.

## Mathematical Problem Solving With the Microcomputer

Commodore 20/64 edition by Stephen L. Snover & Mark A. Spikell.

Apple Logo edition by Susan F. Friel, Stephen L. Snover & Mark A. Spikell.

Sams

Our price \$42.65. Save \$2.25  
and earn 4 bonus points.

## Word processing

## Word Processing with your Microcomputer

L.R. Schmeltz

Comprehensive introduction to word processing, taking you from a discussion of the ways and hows through a look at word processing programs and systems, hardware to a practical assessment of how you can use it and whether or not you need word processing capabilities.

IA9

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and earn 3 bonus points.

## Software

## Databases for Fun and Profit

Nigel Freestone

For users wanting to do their own programming. Provides straightforward introduction to data processing, with explanations of routines in BASIC. Examples of system designs for home and business use, which you can combine and expand. Systems for names and addresses; catalogue, index; diary; stock control; bank account budgeting; debtors list/sale/purchase ledger; payroll.

Granada

Our price \$18.95. Save \$1  
and earn 1 bonus point.

## The Best Book of Lotus 1-2-3

Alan Simpson

While the basics of 1-2-3 are fairly easy to grasp, it takes some time and practice to extract full advantage from this large and sophisticated program. This book — easily followed with lots of graphs and illustrations — gives guidance in creating a worksheet; formatting and editing a worksheet; creating graphs, database management, macros; programming.

Sams

Our price \$25.85. Save \$1.35  
and earn 2 bonus points.

## Database: A Primer

C. J. Date

Dissects data and file management, focussing on how you can effectively use modern database systems and how to get the best from them. Thorough overview of databases, practical examples and exercises, discussion of widely used databases, the "how to's" of report writing, indexing and cataloguing; database design for protecting data.

Addison-Wesley

Our price \$26.00. Save \$1.35  
and earn 2 bonus points.

## CP/M Software Review

Michael L. Gonzales

Easy-to-use rating system which evaluates and compares more than 80 pieces of software for accounting, data management, financial analysis and word processing. Each piece is rated on a four-point scale according to price, value, ease of operation, documentation clarity, function, machine compatibility and overall value.

Pitman

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and earn 4 bonus points.

## Sinclair

## I Wish I Knew about the Spectrum &amp; ZX81

Jonathan Chapple

A book to help both parents and children grasp the basic ideas of computing and provide an elementary knowledge of programming in BASIC language. Both can learn together through a "come-on" visual approach attractively laid out and easy to follow.

Pitman

Our price \$17.05. Save 90 cents  
and earn 1 bonus point.

## Thirty-four Amazing Games for the 1K ZX81

Alastair Gourlay

Claims to be more than just a games collection, maintains it's a guidebook to show you how to make the most of your 1K ZX81. Invites you to enter programs, then improve and modify them with your own stamp. And you can use the author's compressing tricks on other programs.

Interface

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and earn 1 bonus point.

## An introduction to spreadsheets

Electronic spread-sheets are the simplest way to use your computer for budgeting, forecasting, modelling, or even balancing your cheque book. They can be used by anyone who occasionally has to resort to pen, calculator, and reams of paper to solve their financial or mathematical problems.

Almost every major supplier of personal computers now offers a range of these spread-sheets, and the user can choose according to needs, equipment, and bank balance. Whatever you get will save a lot of time, energy, and frustration in handling routine "number-crunching" tasks.

The programs come packaged as a floppy disk, plus manual, and are usable by people with no intimate knowledge of computing. However, it pays to have a good knowledge of your intended application, or access to someone who does — they will not turn you instantly into an accountant or mathematician.

The most suitable applications are those where the calculations or the figures being manipulated, are inter-related in some predictable way. Spread-sheet programs are frequently used for financial modelling, cash-flow forecasts, budgeting, and other planning tasks in business or the home.

Once loaded into the machine, the spread-sheet gives you the electronic equivalent of an enormous sheet of squared paper — 63 columns wide by 254 rows deep, 16,002 squares in all. Each square can be individually addressed and may be assigned a label, or a value which can be either a constant or derived from a formula. These formulas can refer to other squares on the sheet.

### "WINDOW"

The VDU acts as a "window" into the sheet, displaying only a small portion of it at a time. By using commands through the keyboard, this window can be relocated over whatever part of the sheet you want to see. In most cases, it is also

possible to vary the width of the columns so that the window "sees" more of the sheet at a time. And the screen can usually be split so that distant parts of the spread-sheet can be seen side-by-side.

You can format the sheet in an infinite number of ways, depending on your application. Probably the most common method is to give each row and column a fixed name or label. For instance, in a budget, columns would be named after months, rows might have labels such as sales, wages, office expenses, depreciation, etc.

However, it is usually possible (though messy) to put these labels anywhere you like on the sheet. This can be very useful if you have to format your work for printed output and use it in, say, reports.

The hard work starts when it comes to sorting out what calculations are needed and what relationships are to exist between the squares. Constants can be entered once and automatically copied along the rest of the row or column. If the value of a constant changes at any point, the change can be made at the appropriate place without affecting previous entries.

Similarly, formulas (once they have been worked out) can be entered once, and then repeated from square to square with simple commands. Changes can be made as required. If, for example, salesmen's salaries are set at 20% of gross sales income, this need only be entered

the first time it is used and the spread-sheet program can be instructed to copy that formula into each position where it is relevant.

### "CHAIN"

In this way, you can arrange to "chain" or link the squares together so that the output from one formula becomes the input of another, and changes entered at any point are automatically carried through in following calculations.

Sub-totals, totals, averages, percentages, profits, and losses can be easily extracted in this way, often by using arithmetic functions built in to the software. Careful development of the formula used, and crafty chaining of formula can produce an entire year's budget just by entering the sales figure for January.

Working out what your formula or equations are to be is the real stumbling block in this process; and there are no short-cuts.

Before starting work with the electronic spread-sheet, a considerable amount of thought must be given to deciding exactly what you want to achieve with the project you will be using it for. From this, you will be able to determine the logic behind each entry, and the links that naturally exist between the items on the sheet.

Even a very simple application will have quite complex relationships, and careful consideration before you move to the computer will go a long way towards ensuring your work

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## BUSINESS

with the spread-sheet program achieves something worthwhile and sensible.

At this stage, it is very important to have a good understanding of what your problem involves. If necessary, you should be prepared to seek expert help in setting up the spread-sheet. Thirty minutes with your accountant, for instance, will help ensure your cash-flow projections are realistic and not gibberish. (Even with the right background or help, you will also need a good grasp of simple algebra to put your ideas into the formulas the programs work with.)

Doesn't sound encouraging, does it? However, once you have set everything up satisfactorily, it's done and you can save it, on disk, for later use without having to go through the whole thinking process again.

When everything is set up and your first set of figures entered, you can use the spread-sheet to its full potential by playing "What if...?" — possibly the primary justification

for going to all this trouble.

In the old days if you wanted to alter a figure on, say, a budget, you had to spend hours recalculating and rewriting the whole thing to find out the flow-on effects of your change. Not with this type of software however; now you can experiment easily and effortlessly.

Suppose you want to see what effect a change in sales tax, or wages, or in just about anything else has on your profits now, or in six or 12 months time. All you have to do is move, via the keyboard, to the appropriate place on the sheet, enter the necessary changes, then sit back and watch all the figures being recalculated, at computer speed, to accommodate your alterations. And you can do this time after time, exploring every possibility you can imagine.

Once you have a solution, it's a simple matter to save it on disk, or have it printed out for inclusion in a report, loan application, or for permanent reference.

If your problem is important enough to warrant spending a significant amount of time looking into its logical basis and if it involves a large number of inter-related factors, then an electronic spread-sheet will help.

### Accounting package

An Australian small-business accounting package, Magnabiz, is now available in New Zealand. Selling for \$1275, the package, from Magnasoft, of Australia, runs on the Sanyo 550/5 series, the IBM PC, the Toshiba T300, the Sperry Personal Computer, and the NEC APC. The package allows the user to get a complete profit and loss report on one page and a balance sheet on another. It requires two floppies to run: one for the program, and another for storing up to more than 12,000 entries. The New Zealand agent is Edward W. Rankin Holdings, Ltd (P.O. Box 17-069, Greenlane, Auckland).

## Spreadsheets: a comparison

*Derham McAvan, head of the Computer Resource Centre at Christchurch Polytechnic, takes courses on using spreadsheets. Here he gives his views on some of the best-known spreadsheets for microcomputers.*

From my own investigations and most of the overseas reviews five major spreadsheets are showing out in the marketplace. These are (with their typical New Zealand retail prices) in alphabetical order:

	8-bit	16-bit
Context MBA	n/a	1390
Lotus 1-2-3	n/a	895
Multiplan	?	576
SuperCalc II (III)	425 (n/a)	(595)
VisiCalc Std (Adv)	600 (695)	600 (890)

Products excluded for various reasons include T/Maker II (III), MicroPro's CalcStar, and KnowledgeMan.

All five products are powerful, reliable, and well presented. Users can manage without technical support locally and in many cases choice will depend on the equipment available, the range and style of extension tasks to be handled, and the skills and preference of the operator.

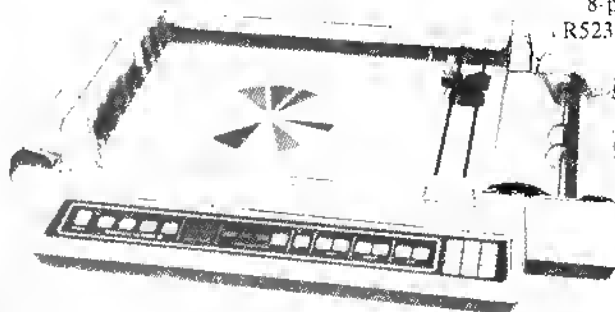
Some of the following material is based on reviews in *Microcomputing* (May, 1983) and *Popular Computing* (June, 1983).

For convenience I have divided the facilities into standard features and extensions. As a rule of thumb I suggest that 80 per cent of all applications would be handled well by the standard features as exemplified by VisiCalc — the original product upon which all the others are closely based. For many users the standard features would be entirely adequate and it would be a waste of money paying for extensions which will never be used. However, in this field the newer, more sophisticated products are also easier to use even at the simple level.

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# BUSINESS

More recent products have the advantages of:

- Learning from earlier inadequacies;
- More powerful hosts and peripherals;
- Addressing a wider range of functions.

Thus it is not surprising that Lotus 1-2-3 beats standard VisiCalc not just on points but for a knock-out.

In the 8-bit world I see the best buy as SuperCalc II. In the 16-bit world I have to spread my bets, in ascending order:

- Multiplan offers sound standard spreadsheet with some useful extensions;
- SuperCalc III is the best buy, offering most of the features of Lotus at a lesser cost;
- Lotus 1-2-3 is the current leader of second-generation spreadsheets and with a third-generation enhancement in the wings will be the package of choice for those using MS-DOS systems.

A comparison by Derham McAven: his rankings, in points from 1-5

	Context M8A (16)	Lotus 1-2-3 (16)	Multi-plan (8)	Multi-plan (16)	SuperCalcII (8)	SuperCalcIII (16)	VisiCalc Std (8/16)	VisiCalc Adv (8/16)
Std Features	4	5	5	5	5	5	5	5

(Note Context MBA is significantly slower than its rivals.)

## Extension

Screen formatting	3	5	4	4	4	5	2	4
Model Consolidation	2	4	4	4	3	4	1	2
Row/Column	?	Y	Y	Y	N	Y	N	N
Sorting	?	Y	Y	Y	N	Y	N	N
Graphics:								
Screen	4	4	1	1	1	4	1	2

(Note: 1 = histogram only, 2= more facilities available in an exterior but associated program.)

Print	5	5	1	1	1	5	1	2
Extra functions	3	5	4	4	3	4	0	2

e.g. Date arithmetic, Internal rate of return, etc.

Database/file manager	2	4	0	0	0	3	0	0
Word Processing	1	0	0	0	0	0	0	0

(Note: Most products provide for output files in a form suited to standard WP packages. This is adequate for most users even if it requires 2 or 3 more steps to set up. "Exports to" below.)

Text Editing	3	1	0	0	0	0	0	0
Telecommunications	3	0	0	0	0	2	0	0

(Note: 2 = associated product.)

Imports from	VisiCalc	DIF DBASEII	DIF VisiCalc	ASCII SDI/DIF	DIF
Exports to		ASCII DIF	SYLK SYLK	ASCII	DIF

(Notes: DIF — the de facto standard Data Interchange Format SDI/DIF accessible in VisiCalc.

SYLK — Microsoft version of DIF — not widely known.

SDI — Sorcim utility which transports a variety of standard micro file formats to or from SuperCalc.)

Training								
Manuals	3	4	3		4		4	
Tutor disks		4(free!)						
ATI	-	4	4		4		4	
Texts	1	4	3		4		4	
Courses	?	Y	Y		Y		Y	

(Notes: In N.Z. several polytechnics and some professional associations offer excellent courses at reasonable fees, but some overseas commercial promoters offer similar courses at very high fees in N.Z. says Derham McAven. There are also some local commercially based courses available.)

Equipment								
IBM PC or clones	Y	Y		Y		Y		Y
CP/M 80			Y		Y		N	
Apple							Y	Y
(& some others)								
Large minimum mem.	Y	N	N	N	N	N	N	N



## BUSINESS SOFTWARE

### COMMODORE 64

# Meridian business package

By Philip Verstraaten

Before contemplating the purchase of the business package, the potential buyer should have performed a system-requirements study, to be able to compare the buyer's needs with features of the package. Each system will generally have a maximum size, due to the limitations of memory in a smaller computer. For some users, for example, this may mean the package cannot hold their number of debtors or creditors.

For a business system to operate efficiently, the minimum peripheral requirements will be a screen, a disk drive, and a printer. For back-up purposes, so important in business, I firmly recommend a second disk drive.

To use the system as a comprehensive management tool, it should be easy to use and provide a variety of reports for analysis. These reports should have a clear and simple lay-out and be very easy to understand, without the need for additional explanations.

Each package generally consists of a number of subsystems or modules, which may be accessed in a variety of ways. One method, which is in use is access through menus. These menus provide a number of options from which one may be chosen. If the screen lay-

outs and the paths between the various modules are clear-cut and in plain language, this method could be called user-friendly.

This really means that the user without any computer knowledge can find his way through the system in a very easy-to-understand way. Part of this is also the ability of the system to check any errors and recovery procedures such as entering incorrect data.

Sometimes the system will not detect errors, which are only discovered later. To be able to trace transactions and find mistakes, an accounting system should have a proper audit trail. This is a hard copy of any transaction that has affected the data of the system. This way any transaction can be traced and checked for errors.

One of the most important aspects,

tributors. The system consists of five modules which may be purchased separately. The main ones are debtors, general ledger, creditors, stock control, with an invoicing sales analysis module which can be integrated with the debtors. All have a similar structure and make use of a master/file, regular transactions, a reporting facility, and an end-of-period run. Each time this run is performed, the existing transactions are wiped, which is why businesses keep back-up disks with data of each period so then any transactions can always be checked.

Debtors and invoicing/sales analysis are two separate modules, which can be used as an integrated system. The size of a debtors ledger may be crucial for a business, especially when it sells many items to many customers. The package

*This is the first in a series of reviews of business software for the Commodore 64. Some level of accounting knowledge is required in order to understand the basic double-entry bookkeeping process and to appreciate the value of each package. This first article also provides guidelines — the basis on which each package will be evaluated.*

especially for a first-time user of an accounting package, is the quality of its documentation. If the system is not accompanied by easy-to-understand, clear-cut documentation, the user may not get full potential from a package, and may even become a bit frustrated by it.

Generally, all features will be a trade-off between costs and benefits. Often the cheaper the package, the less attention will have been given to punctuality and quality.

## MERIDIAN BUSINESS PACKAGE

The Meridian business package is sold by Proton Electronics, Ltd, of Auckland, through a number of dis-

provides for up to 490 accounts and 1910 transactions per period.

A number of details about each debtor are contained in each account, of which the credit limit and an analysis code to be used with the analysis module, are very useful. Analysis is provided through 80 customer types, 80 sales types, 10 sales tax codes, and 200 different lines, like product types. It will definitely require some careful planning in order to implement a good analysis system, but will provide an excellent management tool.

Analysis reports can be printed, so figures of various periods may be compared. This module prints reports, like year-to-date customer type analysis, year-to-date sales analysis, line analysis, sales-tax file details.

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## BUSINESS SOFTWARE

The debtors ledger is automatically aged with the end-of-period run and prints monthly statements. So if a business also requires an invoicing feature, the separate analysis invoicing module must be purchased.

The creditors module maintains a master creditor file of a maximum of 250 accounts which incorporates a ranking procedure, to determine priority of payments, a very useful feature in times of tight cash flows. Invoices which are received, are entered into the accounts through a "LOG" option and approved for payment through the "APPROVE" option. In any one period the system can accept up to 1600 transactions and use 80 different product analysis codes.

The reporting facility is varied and flexible, providing the user with a number of selection criteria such as priority of payment, age, and analysis code. If the inventory/stock control module is purchased as well, one has to maintain two suppliers files. It would make the system more flexible if these two modules could be integrated.

For a business wanting to maintain a perpetual inventory system, the stock control module allows for up to 1000 stock items and 99 suppliers. Some of the main features in each stock record are a location code, sales-tax percentage, minimum stock level, re-order quantity, and wholesale and retail price. Of the different reporting options I especially mention the stock re-order report and sales analysis report. The latter is an excellent management tool, especially in combination with the sales-analysis package.

The stock re-order report is a result of the minimum stock level and re-order quantity, which highlights those products that should be ordered. The most difficult task, however, is to

determine these levels and quantities, taking into account demand and lead times. For all inventory reports, segments may be printed by entering a first code, last code, and a product selection through the location code and a key.

### GENERAL LEDGER OF 400 ACCOUNTS

The general ledger module has already been set up with a chart of accounts, suitable for many businesses. After a familiarisation period the user may modify or expand the ledger according to his needs. The ledger can hold up to 400 accounts, which contain information about budgets, debit or credit amount, a percentage analysis facility, a reference and some features for reporting purposes.

Transactions are entered into the ledger through batches, up to 120 per period. The batch numbers, however, are not unique, which may lead to some confusion if a number is used more than once. Batch numbers are very useful in tracing particular transactions, and an error message in cases of duplication would be handy. Batch totals are checked if out of balance and the message is displayed with the option either to abort the batch or enter additional transactions.

The system provides for 1000 transactions per period, with separate entries for debits and credits.

The user can create up to nine reports according to four different lay-out types. A number of reports such as profit and loss account, balance sheet, trial balance have already been created which the user can adopt or modify. Budget analysis is easy to use, resulting in a report comparing actual with budgeting amounts, stating any variances.

A number of printers may be used with this system. The manuals provide for a Commodore 1526 bi-directional printer, but I have used a MPS 801 graphics printer which worked perfectly.

The system facilitates comprehensive reporting mostly through a variety of options. Some reports, however, need additional explanation, as they compress a lot of information. No choice is provided to print sorted according to a particular key.

Access to the various features of each module is through menus, which are clearly laid out and are operated extremely easily. The user can jump forwards and backwards to the various options and can cancel the present option by entering ('CLR/HOME').

Vital data fields are protected from entering invalid characters, with an excellent error recovery. The number of errors will also be reduced by the appealing screen lay-out which makes all data easy to check.

For each transaction which affects the data an audit trail is provided, which includes information about the accounts and any references.

A strong point is that the package is guaranteed for life, which means that bugs which are not due to user mistakes, will be fixed free of charge. A few hours implementation advice and introduction is included in the price, which is \$195 per module.

The documentation provided is very well laid out and easy to follow with examples and suggested sequence of operations. This enables the first-time user to become acquainted with the system very quickly.

The computer programs cannot be accessed, which means that the purchaser cannot make any modifications if so required. After purchasing the module a registration form must be sent to the main supplier, Proton Electronics, Ltd, which will return a key code. This code must be entered into the package and will release it for further use, without which the system would lock after three end-of-period runs. This is obviously to protect any copying and use by others.

**Conclusion:** The over-all system is an easy-to-use, comprehensive business package, and good value for money. I would not hesitate to advise a small business to purchase some of the modules, especially the general ledger, which I consider cheap at \$195. Because of the excellent documentation most users will become familiar with the package very quickly. It is, however, not a substitute for accounting knowledge: a basic understanding of double-entry bookkeeping is still required.

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## BUSINESS SOFTWARE

# K'man has potential but needs refining

By Derham McAvan

I came to Knowledge Man with high expectations based on the quality of the previous product from the same authors. MDBS is still the only package offering true mainframe style database on a micro, but it is too complex (and costly) for all but the most advanced software houses. Knowledge Man comes much closer to being a self-contained flexible and yet powerful file manager priced at around \$NZ1000.

First of all the bad news. K'man is rather unfriendly: even an experienced programmer could spend much time becoming conversant with its commands. The manual is particularly difficult, betraying the typical programmer pre-occupation with spelling out fiddly detail, and lacking an obvious structure which would help with adequate familiarisation or subsequent cross-reference. (I was reminded of original CP/M and WordStar documentation.)

I set up a limited test application in about five hours: one file of customer master records and another file of transaction records keyed by the customer record number. Among the difficulties I struck:

- A minute to sort a file of just 12 master records from numerical order to forename within surname.
- Contrary to the manual's claim, I could not edit either file definition or form(screen) definitions with WordStar (or any other way) which meant a number of false starts.
- Much is made of being able to extend an existing database but the value of this is decreased by only permitting additional fields at the end of a record.
- While the spreadsheet can support more complex operations than any other I know — particularly in transfers to and from databases — for the common tasks (90 per cent) its

syntax and commands are awkward.

- A successful compound inquiry succeeded only when the package was freshly entered and files first loaded. The same inquiry attempted a second time failed! I suspect pointers were not being reset and I could not find a solution in the manual.
- K'man is available only for the IBM PC and clones.
- And the good news:
  - K'man is potentially more versatile and powerful than competing products. Although this implementation is flawed the concepts are more modern. (Dbase II after all is an old and limited product dressed up in fancy promotion.) K'man has far fewer limitations in terms of files open, fields, record sizes and counts, range of commands, etc than its rivals. Lotus 1,2,3 is easy to use and fine for spreadsheet and simple graphics, but very weak for other data management.
  - The makers of K'man are capable of refining this package (and its documentation) into an effective and valuable facility.
  - File space is compact.
  - Encryption and other privacy/security features such as field access controls and passwords are worth-while features for many commercial applications.
  - Even for large files the speed of access supported by the indexing (B+trees) is impressive. Any file may have multiple indexes to contribute further to inquiry flexibility.

**Conclusion:** For most simple applications involving less than 1000 master records I would still choose Infostar especially as I don't have another proprietary language. K'man needs another cycle of refinement before it realises its potential and earns a place as a leader in micro file-management/database packages.

*Test package supplied by  
Businessworld Computers, Ltd.*

## Where are you, D Rose?

D Rose, of 27 Fifeshire Cres, who ordered "TRS-80 Data File Programming" from our June issue, please let us know which town or city you live in and we'll get your book on its way.

# Kiwi word processor for \$95

By John MacGibbon

More word processing programs have been written for the Apple II family of computers than for any other computer in history. Literally dozens are available: do we really need another one?

If this were America, one might well say, Like a hole in the head. But this is New Zealand. This is where a limited el cheapo \$50 program like Bank Street Writer translates to \$150 after being savaged by the exchange rate, duties, and sales tax.

To justify its existence, a new word processor needs a good gimmick. One new entrant, Fulltext-55, has a good gimmick: it's cheap. At only \$95, it does most things a \$300 program can do, and an awful lot more than Bank Street Writer.

Fulltext-55 is a New Zealand program, written by a University of Otago maths lecturer, John Shanks. It was written because John refused to pay \$700 plus for an 80-column card plus American word processor. In true dinkum Kiwi style, he wrote his own.

Aware of the limitations of the Apple II's 40-column screen, John produced 55 columns, by using the hi-res screen. It was a kind of poor man's ScreenWriter II. (ScreenWriter gives 70 hi-res columns — for \$275.)

Visually, Fulltext's 55 columns are a mixed blessing. Certainly you see more of a document on-screen, but you still don't see enough, and have to switch into an inconvenient "view" mode and scroll back and forth horizontally to see how it will print. But yes, it is marginally better than a 40-column word processor, and at least you are shown where page breaks will occur; something some pricier programs, including ScreenWriter, don't offer.

However, you must use Fulltext-55 with a proper monitor. It is almost impossible to read on a TV set.

Fulltext-55 is leagues ahead of the 40-column programs in its capabilities, which approach those of a full office word processor such as Zardax or Applewriter II.

## ASSEMBLER AND MAILER INCLUDED

All the standard features, such as cut and paste, delete and undelete, search and exchange, and so on, are offered. There is also very extensive page formatting and print-style control, and the ability to define one or two character "macros" which automatically insert

# IIc released, but not here

By John MacGibbon

Apple launched the Apple IIc in fine style late in April. Multiple IIc's and Herbie Hancock's music entertained no less than 3500 dealers who attended an all-day bash in San Francisco.

Apple has budgeted to sell 400,000 units in the first year, and is gearing up to make 100,000 a month on a single shift basis at a new factory in Texas. It is aimed squarely at IBM's PC Junior.

The new machine was released simultaneously in Australia, but CED's marketing manager, Mr Brian Eardley-Wilmot, tells us the New Zealand release may still be several months away.

The IIc is essentially a IIe in new packaging. A IIe, that is, with an extended 80 column card giving 128K RAM and double hi-res graphics.

The computer is briefcase sized: scarcely wider than the keyboard. It is about 2in thick and weighs only 3.5 kg. One slim-line 143K, 5.25in floppy disk drive is built into the side of the unit, while an extra drive can be plugged into the back.

standard paragraphs, print-control sequences, and so on.

The package includes a mailer, which many other programs either don't offer, or charge extra for. Another "extra", of interest to machine-language buffs, is a fast and efficient assembler program.

Fulltext-55 can be a simple or a complex program, depending on users' needs, interests, and abilities. It could easily and quickly be used by occasional letter-writers, who would find it's on-disk tutorial and ever-present screen prompts very helpful.

On the other hand, fancy formatting, printer font control, and setting up of macro definitions is tricky and could be very daunting to a computer novice. The manual is generally well written, but in places it lapses into symbolic, semi-algebraic language.

While Fulltext-55 has some definite strengths, it does have a few drawbacks. My chief criticism is the swapping of modes between insert and edit functions. While this technique keeps control key moves to a minimum and generally makes things easier for beginners, the constant chopping and changing slows things down for the experienced user. The technique is particularly annoying if one has to go through a body of text making many alterations.

While in insert mode one can go back over what has been written and correct a mistake by simply typing over it. But one cannot go back while in insert mode and add extra characters without a game paddle button or "open apple" key.

It is not expandable, at least not in the conventional Apple "slots" sense. However, the company says two serial ports in the back can be used for accessories. CP/M is not available.

Later this year Apple expects to release an optional 80 column by 24 line LCD screen for a reported \$US500. In the meantime, it is selling a newly designed standard screen. Also released with the IIc is the new apple Scribe thermal printer, which prints in six colours on plain paper. A mouse is available.

Apple claims the computer will run 90 per cent of existing II series software, the only problems being where developers have ignored recommendations re copy protection or memory locations.

The IIc was released with 21 popular software packages redeveloped to take advantage of the additional memory.

We haven't discovered the American price yet, but in Australia the recommended price is \$Aust1775 for a basic unit with built-in drive. The price of the IIe as been dropped to \$Aust1295 (computer only — no drives, etc.)

Apple's IIe series is to continue, and now we know what the "e" means: expandable.

There is one trap which can have serious consequences. If, while in insert mode, you take the cursor back in the text to fix a spelling mistake and then find you really need to delete a word, you have to switch back into "edit" mode.

But if you do, all text to the right of the cursor will vanish forever! Naturally one would soon learn not to do this kind of thing, but the program shouldn't allow it to happen in the first place.

The technique for printing double or triple space type is unusual, to say the least. Instead of simply specifying the

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## APPLE

number of spaces in the print menu, you actually have to ask the printer to print half the number of lines per page (i.e. 31).

Unlike most of the newer word processors, Fulltext-55 does an old-fashioned word wrap on the right margin, thus splitting words up on the screen (though not when printed). The better way is for words to skip to the next line if they can't fit flush against the right margin.

These may sound like serious charges against the program, but in reality they should not be a great consideration, particularly when stacked against the price being asked. Most word-processor programs have their foibles, and experienced users usually become adept at compensating for them.

Fulltext-55 is certainly an excellent program for the occasional user, but really it has so many bells and whistles that having only 55 columns is a frustration. It does nearly everything a professional might need — except give the all-important professional 80 column display.

A query to the programmer on this point yielded the welcome information that an 80 column version is in the works. An update will be available free to users who have the current (white covered) manual. Owners of older (red) manuals will pay \$10 extra.

The program has already been updated several times over the last year. For instance, there are now two versions (both on the same disk). The newer version takes advantage of a language card to streamline editing functions and add some new tricks.

Another change has been a switch from binary text file generation to standard DOS 3.3 text files, compatible with most other word processors and some database programs. Updates are free, and the current disk includes a

program that converts older files to the new format.

Fulltext-55 offers excellent value in its current version. The new 80 column version, in combination with cheap Taiwanese 80 column cards now readily available, will at last give New Zealand Apple owners professional word processing at a reasonable price.

**Availability:** From most dealers or direct from Specific Software, PO Box 8035, Dunedin. Phone (024) 738-396.

### "Serious" data centre

A new workstation designed specifically for the "serious" computer user — IBM PC or similar — has been released by Silkwood Manufacturing Ltd, the Auckland-based company which launched its first computer bureau more than a year ago.

Silkwood has developed the new data centre to incorporate a printer unit, paper, diskettes, manuals and reference material.

The bureau also incorporates a copy stand between the raised position for the screen, and the keyboard. Cables, power pack, disk drives and reference data can be stored yet remain accessible.

In a polished walnut finish, the knock down bureau has a simple allenkey locking system which makes the unit stable and easily assembled.

The Auckland price is around \$375.

Further information: Silkwood Manufacturing Ltd, 8 Tironui Road, Papakura. Phone: 298-7089 Auckland.

## DISKS

From page 36

name length and two bytes to record the first track and sector, each sector could only store  $(256/18) = 14$  file names. The entire track would only allow the storage of  $16 \times 14 = 224$  files. That may not be enough and I am being very conservative in the space needed for each file.

A design decision has to be made in terms of file storage. Do you want all the sectors used to store a file to be next to each other (continuous storage), or not? If you do want this, it means quick reading and writing once you have found the correct spot because the read/write head no longer needs shifting. However, a file may not fit into a gap available and the disk could appear full even though you know there is enough room. That means you must be able to shift all the files and tidy things up to bring all the gaps together.

This kind of problem where the holes are small and scattered is called fragmentation and occurs in the organisation of computer RAM memory as well. The disk operating system that employs the contiguous design will provide you with the ability to bring the gaps together but you must do the housekeeping! A "Krunch" instruction of one kind or another would be available to you so that you can keep the gaps together.

The advantage of such a system is the speed of access and the storage economy of sectors used just to keep track of a file's position.


In the next article I will discuss another method of directory organisation which overcomes the fragmentation problem at the expense of some extra read/write head movement and additional disk space lost as an overhead to the method.

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# Some hints for new users

By Peter Archer

Over the past two years I have noticed that new VIC owners often ask the same questions about problems that they are having. Some of these difficulties can be easily overcome with a simple explanation of what is happening, and I intend to present in this column over the next few months answers to some of the most common problems. More experienced readers will have to bear with me, as these are beginners' problems.

## Computer Reset

**Question:** When I have finished running a program and type NEW, and then load another program, sometimes strange things happen. For example, in my unexpanded VIC I sometimes run out of memory when running a program which should fit in. Does the NEW command completely reset the computer, and if not is there some other better way to do a total reset (other than switching the power off)?

**Answer:** The NEW command does not totally reset the computer to the state it is in when the power was switched on. During the running of some types of programs, a portion of the computer's memory may be reserved for some special purpose, the most common being the storage of "custom characters". To prevent the BASIC program from overwriting this part of memory and perhaps destroying the special information, one or more of the computer's pointers may be set to a non-standard value to change the amount of free memory which the computer thinks it has available for its BASIC program.

The trouble with the NEW command is that (for a very good reason) it does not restore these pointers to their "normal" values.

So, if you have finished running one program and now wish to load a different program, it is best to use an alternative command which will totally reset the computer and restore all the pointers to their "normal" values.

The best way to do this is to simulate a cold start by making the computer go through the cold start routines which take place when you turn the power on.

For the VIC the command to use to do this is SYS64802. (For the '64 it is SYS64738.) The "SYS" command makes the computer execute the machine language instructions starting at the address specified, which in this case is the start of the "cold start" routine.

## Load Errors

**Question:** Sometimes when I try to

# Auto screen RAM selection

By Paul Graham

VIC users know that when they plug in an 8K or more RAM cartridge, the screen and colour memories are moved. Therefore, they must change all screen POKEs from one location to another.

Instead of doing this, when writing a program make any POKE to the screen a variable: SM for screen memory and CM for colour memory. These variables can then be set to the start of the screen and colour memories. The program below has an example of this. The first three lines of the program are made to set the screen and colour memories correctly.

*load a program from tape, instead of the usual READY message, I get some other messages such as LOAD ERROR or some other strange message. When I then LIST or RUN the program, strange things happen. The program may only be partly there, or I get funny error messages, such as UNDEFINED STATEMENT ERROR.*

**Answer:** Commodore computers have a very sophisticated error-checking procedure built into their tape loading routines.

When a SAVE is made to tape, the program is actually saved twice on to the blank tape. As the computer saves each byte of a program, it also saves a parity bit on to the tape. This parity bit is set to either a zero or a one, depending on the sum of the bits stored in the byte being recorded.

When you LOAD a program from tape, as each byte is loaded into the computer's memory the computer recreates the parity bit from the byte coming off of the tape and compares it with the parity bit which was recorded on the tape. If these two parity bits are the same, it passes the byte as being error-free.

But, if the parity bits are different, the computer knows that an error has occurred and keeps a note of which byte it is that is in error. It stores this information in its "error log", and replaces the faulty byte during the second pass of the tape (i.e. when the second copy is taken off of the tape).

This clever procedure normally results in a very reliable tape storage system for your programs, many minor errors being corrected without the user's even being aware that they existed.

But two things can possibly go wrong, resulting in the dreaded LOAD ERROR message.

The error log can only store a limited number of error registrations during the loading of the first copy of the program. If this number is exceeded, the computer considers that the copy of the program coming off the tape is so badly mutilated that it is beyond recovery. It therefore displays the LOAD ERROR message.

The first line sets the screen and colour memories for a VIC with less than 8K RAM. SM = 7680 CM = 34800. Line 20 checks the position of the screen. If SM and CM are set correctly the program moves on to line 100 and skips line 30.

If the check in line 20 fails, line 30 sets SM and CM to the right values for an 8K or more RAM cartridge.

Lines 100 up make a test pattern on the screen. The program will run on any combination of VIC RAM.

```
10 SM=7680: CM=38400
20 IFPEEK(648)=30 THEN 100
30 SM=4096: CM=37888
100 FORX=242TO263
110 POKECM+X.86
120 NEXT
125 FORA=0TO7
130 FORX=242TO263
140 POKECM+X.A
150 NEXT
160 NEXTA
170 GOTO125
```

You can check the number of error substitutions which have been made on the computer during a tape load by PEEKing into a special memory location. On both the VIC and '64 this location is decimal address 158. So if you type PRINT PEEK(158), the number printed on the screen will tell you the number of error substitutions that have been made during the most recent tape load.

The other thing that can go wrong is, of course, that if one or more bytes of the program is in error on both copies of the program, then that byte(s) is (are) lost, and there will be a load error.

Sometimes the copy of the program on tape is so badly mutilated the computer does not attempt to complete the load. It may fail to find the program at all, or it may display a garbled program name, or it may terminate the load with a strange error message. If any of these things happens, it means that something has gone seriously wrong with the LOAD, and any attempt to LIST or RUN your program is futile.

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## Hardware expansion

Most VIC users sooner or later come up against the rather limited amount of memory in a standard VIC-20 computer. You will probably have thought of buying extra memory; you may already have done so. There are various memory expansion options open to the VIC owner, and I will try to clear up some of the confusion surrounding these.

### 3K expansion

The smallest memory expander available for your VIC has just 3K of extra RAM. As this almost doubles the 3.5K in the unexpanded machine, you may think that this is quite an advance. But for \$79.50 (the list price of Commodore's 3K expander), this is not a very good buy. For only \$10 more you can have the "Superexpander", or for an extra \$40 you can have an extra 8K. Hardly any commercial software is available to take advantage of the extra software: most games, etc., are made to fit the standard machine or require an extra 8K.

### "Super Expander"

The Super Expander also contains an extra 3K of RAM. Its 3K RAM fills the same gap in the VIC's memory map as the 3K expander does. But it also contains 4K of ROM which adds many extra commands to the VIC's BASIC. These include commands such as PLOT, CIRCLE, and COLOR to do drawing on the screen.

If you are interested in programming, and feel that you would like to have the extra commands available to you, the Super Expander is good value. You can have hours of fun playing around with the graphics commands. But if you are not into programming, then the Super Expander would not be a good buy, for almost no commercial software available is designed to take advantage of the extra commands. There are two reasons for this. One is that most commercial software (especially games) is written in machine-code, not BASIC. The other is that software developers are reluctant to risk producing software for other than the "mainstream" owners. If a programmer can make his program fit into a standard unexpanded computer he will; if not, he will design his program to suit the 8K expander, which is the most popular form of expansion for the VIC. This is not helped by the fact that the Super Expander and the 8K expander are to some degree not compatible in that they fill up different gaps in the standard VIC's memory map. It is difficult to design the fancier machine-code type programs to work on both.

### 8K Expansion

This is the most popular type of expansion for the VIC. The list price of Commodore's own 8K expansion in New Zealand is \$109.50. Other brands are sometimes available at varying prices. With an 8K expander you have about 11.5K free for BASIC, which is enough

for many hobbyist programmers. A good number of commercial programs, especially games, are available to take advantage of the extra memory.

### 16K expansion

For those of you who feel that 11.5K is still not enough, an extra 16K will give you 19.5K free for BASIC. This will satisfy just about anyone. Commodore's version costs \$159.50, but other brands are sometimes available. A reasonable number of commercial programs which require the extra 16K are available. These include some very good games, and the VIC versions of Primesoft's farm management software. With the 16K expander you can run all of the 8K software.

There are other expansion options for the VIC, and over the next month or two I intend to cover some of them.

## Games

I am often asked for a recommendation as to what is a good, inexpensive game "for the kids" for the unexpanded VIC. The following three are good value, especially as they all run in an unexpanded VIC with only 3.5K of RAM.

### Space Wars

One of the most popular "space wars" type games for the VIC is "Gridrunner". This sells in New Zealand for \$19.95 on tape and at this price is very good value. I have been told that New Zealand is the only country where this game is sold on tape. This is because of our stringent

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## VIC

import regulations regarding cartridges.  
**Old Favourite**

One of my old favourites is "Amok". This has been around for almost as long as the VIC, and is still good value at \$19.95. If you like a challenging action type game, but are sick of the "space wars" type, this one is worth considering. It is your job to clear a space station of many dangerous robots which have "run amok". I have always liked the way the little man runs around the screen under the control of the player, and I am sure that you will, too. There are four colours of robots, each succeeding colour being worth more points. A joystick is recommended, as the key controls are very difficult.

Both Gridrunner and Amok are distributed in N.Z. by Viscount Electronics, of Palmerston North.

### Pacman

I am often asked to recommend a "Pacman" type game for the VIC. The best ever Pacman that I have ever seen on any computer was the old Commodore cartridge "Jelly Monsters". This was unfortunately withdrawn after a copyright infringement court case in the United States between Commodore and Atari (which owns the Pacman copyright). Its replacement, "Cosmic Cruncher", is but a shadow of "Jelly Monsters". So if you ever have the chance to buy a second-hand "Jelly Monsters" cartridge, snap it up!

The best, inexpensive Pacman-type game on tape for the unexpanded VIC I have seen is "Dot Man", by the English firm, Anirog. Anirog software for both the VIC and '64 is distributed in N.Z. by Alpine Computing, and most of its games are of good quality. All are priced at \$24.95. "Dot Man" is a good solid Pacman, and while not in the same class as "Jelly Monsters", it is very good value.

### Magazines

I am often asked, "What is the best computer magazine from overseas for Commodore users?" I always reply, *Compute's Gazette*, which specialises in VIC and Commodore-64, and its parent publication, *Compute!*, which also gives very good coverage to Commodore. If your book store or computer dealer does not have these, tell them they are distributed by both Gordon and Gotch and Viscount Electronics.

Next month, I intend to give some more answers to beginners' problems, to have a look at some of the more exotic expansion options, and look at a few more games.

### Missing line

We left the last line off the VIC 20 program in our June issue. It was:  
3060DATA1,128,2,64,3,32,4,16,-  
5,8,6,4,7,2,8,1

## COMMODORE

# Error messages No. 2

By Tony Graham

When the ILLEGAL QUANTITY error occurs a number is too big or too small for the computer to use in the function being attempted. Most frequently for beginners the ILLEGAL QUANTITY error will be the result of using a POKE with a value of more than 255 or less than 0. Negative numbers are, of course, all less than 0.

The restriction is brought about by the fact that one byte has only eight bits, and with eight bits only 256 different combinations are possible. From BASIC we see these as 0 through to 255.

When using a statement such as POKE7680,K the variable K must be kept within the range of 0 to 255.

Other ILLEGAL QUANTITY errors that occur include:

MID\$(A\$,0,2) — Here the value zero is not permitted.

LOG(0) — Again the value zero is not permitted, nor is any negative number.

ASC(X\$) — If X\$ happens to be a null string, i.e. X\$=""

TI\$="" — This special variable, reserved for time, must have 6 digits between the quotes. TI\$ is reset with TI\$="000000"

TYPE MISMATCH errors are the result of trying to use a number instead of a string, or the other way round. Here are more examples of likely errors:—

ASC(X) — Here X should be X\$.

X\$=Y — Y should be Y\$ or "Y".

LOG(X\$) — X\$ should be X.

LEFT\$(X,2) — X should be X\$, but note the same error message is displayed if the variable X\$ is missing altogether, and of course the same is true of MID\$ and RIGHT\$.

DIVISION BY ZERO error: Division by zero is not possible in mathematics. A statement such as PRINT 100/X will generate a DIVISION BY ZERO error, if X=0 at the time the statement is run. Any other value of X will be processed. If your program uses a line where this error may be encountered, it is wise to place a check to branch around that line. For example a line such as this:— 60 PRINT 100/X

Would become:—

```
50 IF X = 0 THEN 70
60 PRINT 100/X :GOTO80
70 PRINT 100
80 REM Next line.
```

This avoids any error.

The NEXT WITHOUT FOR Error: If NEXT K is used but no line using FOR K has been run the NEXT WITHOUT FOR error is displayed. The same error occurs if FOR — NEXT loops are incorrectly nested. The term nesting means one loop running inside another.

The following example will show how these run by printing out the sequence:—

```
ABCCCCBCCCCBCCCCABCCCCBCCC-  
CBCCCC
```

```
10 FOR A=1 TO 2:PRINT"A";  
20 FOR B=1 TO 3:PRINT"B";  
30 FOR C=1 TO 4:PRINT"C";  
40 NEXT C:NEXT B:NEXT A
```

Note that the variables A,B, and C, in line 40 are in the reverse order, to that in which are first run.

If the variable names in line 40 are deleted so that the line only reads NEXT:NEXT:NEXT the program will still run correctly, however LISTings are much harder to understand.

Try swapping the variables A,B and C, in line 40 and note the results obtained before the program crashes with a NEXT WITHOUT FOR error.

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## Support strong in the south

By Steven Darnold

A few weeks ago I visited Christchurch, and I was pleased to see the strong support that the Commodore 64 is getting in that city. Not only is Commodore hardware available from many shops, but some dealers also have impressive arrays of software. In addition, the Christchurch Commodore Users' Group is going from strength to strength.

I was most impressed by GT Computing, in Gloucester Street. It has the largest collection of Commodore 64 software I have seen. All the latest and greatest programs are there, right out of the pages of *COMPUTE!* magazine. I didn't realise that so much overseas software was already in the country. If you're in Christchurch, it's well worth having a look.

Over all, I found the Commodore dealers in Christchurch reasonably knowledgeable about the 64 and its capabilities. Even the man in Farmers (FTC) seemed to know what he was doing. This was not the case, however, with some non-Commodore dealers. For example, I visited the computer sections of four stores from a well-known chain without finding a single staff member who knew much about the BBC micro. Similarly, I encountered a dealer with a Spectravideo 328 on display who

insisted that it was an MSX machine (in fact, it's the new Spectravideo 728 which follows the MSX specifications).

This lack of clear and accurate information makes the task of selecting a microcomputer much more hazardous for the naive customer. Pity the poor customer who buys a machine without realising that it is no longer being manufactured. Pity the poor customer who buys a machine without realising it has relatively little software. Lots of different home computers are on the market right now, but only a few are really worth buying. Caveat emptor.

### Modulators

While in a Christchurch shop, I noticed a Commodore 64 with a VIC modulator. Further investigation revealed that all the Commodore 64's sold in Farmers', Wrightson's, and other non-specialist stores are being supplied with external modulators. I rang Commodore in Auckland for an explanation.

All Commodore 64's arrive in New Zealand with built-in UHF modulators. Most overseas TV sets have UHF tuners so no VHF version is being manufactured. However, most New Zealand TV sets have only VHF tuners. Commodore (NZ), therefore, alters the built-in modulator to broadcast a VHF signal. This is not a simple job.

Commodore (NZ) is not the only New Zealand distributor of the 64. Fountain also distributes Commodore computers. Fountain, like Commodore (NZ), receives 64's with UHF modulators; however, Fountain solves the problem in a different way. Instead of altering the built-in modulator, Fountain simply sticks an external, VIC-type modulator into the audio-visual port. This is easier than altering the built-in modulator, but there is a fish-hook: in order for the VIC modulator to work on the 64's audio-visual port, one pin on the port must be altered.

If your Commodore 64 uses an external modulator box, then you have a rewired audio-visual port. This will not be a problem unless you want to connect something else to the audio-visual port. For example, if you try to connect a monochrome or colour monitor to the 64 with a standard cable it will probably not work. You will need a special cable. Before you buy a monitor, tell your dealer that your port has been rewired, and he will fix you up.

Because of Fountain's approach to the modulator problem, we now have two different types of 64's being sold in New Zealand. Some have built-in UHF modulators, and some have VHF; some have the audio-visual port wired one way, and some have it wired another.

### C-64 in schools

Two years ago the State Services Commission undertook an evaluation of microcomputers suitable for use in New Zealand secondary schools. The report was completed in November, 1982, but the announcement of the results was limited to an alphabetical list of approved

computers. No justification was given for the inclusion or exclusion of any computer.

When I received my copy of the evaluation report (for details, see the June edition of *Bits & Bytes*), I was surprised on several counts. One of them was that half of the computers submitted were not evaluated. This included the Commodore 64, IBM PC, Microbee and Ohio Scientific.

The committee based its analysis on a short-list of eight computers. The Commodore 64 and IBM PC were deferred for later study, but two years have passed without their being evaluated, despite requests from both New Zealand distributors.

Despite its exclusion from the approved list, the Commodore 64 is selling well to schools. Latest estimates put it in second place, well behind Apple and slightly ahead of the BBC. It appears that the three 6502 machines have become the de facto standard in New Zealand schools.

Three months ago the Department of Education set up the Computer Courseware Development Unit to organise and distribute computer programs for secondary schools. Initial reports indicate that only the computers on the approved list will be supported. This is ridiculous. Why should the unit be bound by a report, which the Minister himself says is "out of date"?

Rather, the unit should ascertain which computers the schools are using and direct their efforts toward providing programs for the most popular school computers: the Apple, Commodore 64, and BBC.

### Reset buttons

Since mentioning in my May column that reset buttons are available for under \$10, I have had a number of letters from readers asking where to obtain one. Apparently some dealers are asking as much as \$60 for a reset button.

Office Equipment Southland (Box 1079, Invercargill) sells reset buttons for \$5.95, plus 50c for postage and handling. A lower price for bulk orders is available to dealers and user groups from the manufacturer: Peter Friend, 92B Doon Street, Invercargill.

These reset buttons simply plug into the serial port on the back of the computer. If you already have a disk drive or other peripheral plugged into the serial port, then the reset button goes into the pass-through port on the back of the peripheral. Unfortunately, the following peripherals do not have a pass-through port: 1515 printer, 1520 plotter, and most parallel printer interfaces (e.g. MW-302 and Cardco).

If you are using a peripheral without a pass-through port, then a serial port reset button will not be suitable. You will need a reset button which attaches to the user port or to the cartridge port. Such a reset button is likely to cost more than the serial port version, but it should be less than \$20.

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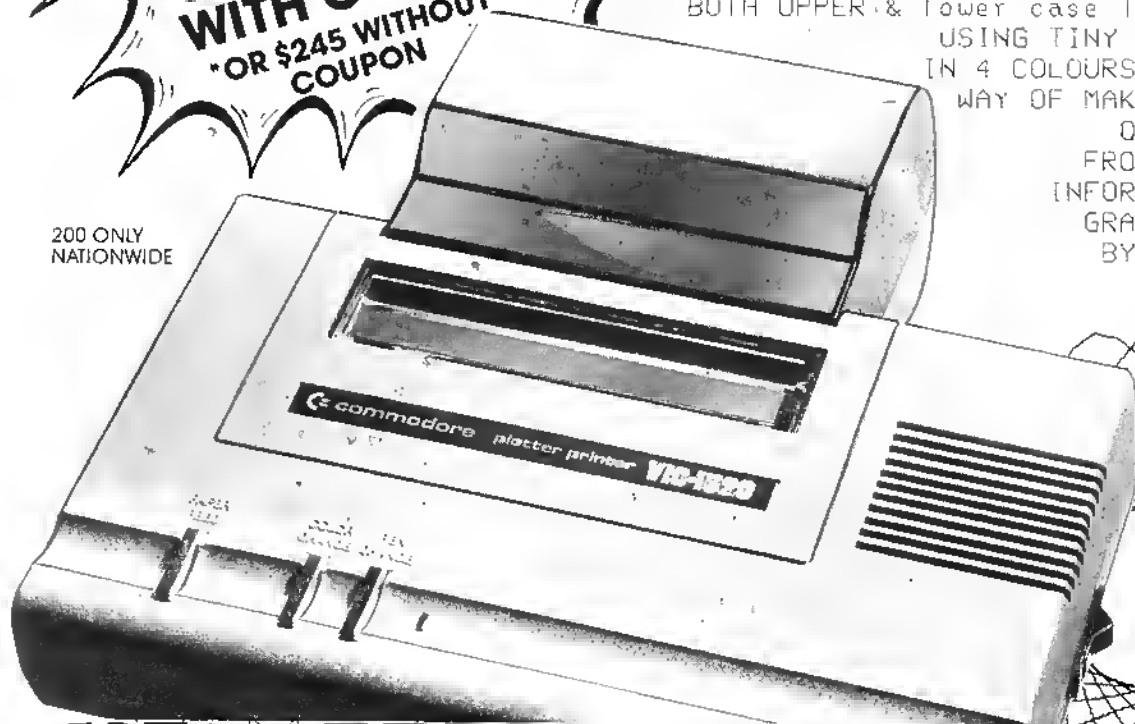
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# COMMODORE 64

## Reviews

I am keen to review new software and hardware for the Commodore 64, particularly those items suitable for home users. Producers and distributors are welcome to send me review copies at P.O. Box 201, Alexandra. Unless special arrangements are made, review copies will not be returned. Usually they are offered as prizes in my monthly competitions.

This month I have four new games distributed by Alpine Computing. The first three are from Anirog, and the fourth is from Romik. All four games come on cassette tape, and they all cost \$24.95.

### Starbase Defense

Starbase Defense is designed to work with the Stack Light Rifle, although it can also be played with a joystick. The game itself is slightly reminiscent of Missile Command. Bombs appear high in the sky and your task is to blast them before they destroy your cities. At first you can fire freely because you are getting power from all the cities. However, as bombs slip through and destroy the cities, you get progressively less power and need to choose your shots more carefully.

I don't have a light rifle, but if anyone in New Zealand happens to have one, then this game is worth considering. The graphics and sound are okay, and it makes good use of the light rifle. However, as a joystick game, Starbase Defense is not so good. The main problem is that the joystick cross-hairs move too slowly. At top speed it takes five seconds to move from the left edge of the screen to the right edge. This is very frustrating when you're trying to move the cross-hairs on to a missile before it destroys a city. In addition the missiles are not always destroyed when you blast them. Sometimes one explodes the first time you hit it; sometimes you hit one ten times and still lose your city. This is frustrating.

I suspect that most of my frustrations would disappear if I were using a light rifle. I could zip from one end of the screen to the other without delay, and it wouldn't matter so much that some missiles had to be hit several times. Therefore, if you've got a light rifle, this may be just the sort of game you're looking for.

### Cosmic Commando

Like Starbase Defence, Cosmic Commando is designed for the Stack light rifle, and it too can be used with a joystick. The game is basically a shooting gallery. Targets appear one at a time and bob around as you try to shoot them. When you have destroyed all the targets, there are various bonuses based on your rate of fire and accuracy.

Over all, the graphics are reasonable, but not spectacular. The targets get larger as the move forward so there is a rudimentary 3D effect. The sound of the gun shots is good and the other sound effects are adequate.

I don't know about the light-rifle version of the game, but the joystick version is not very accurate. On many occasions I had the cross-hairs squarely on the target and my shot registered as a miss. Unfortunately, the number of shots is severely limited, and just a few misses will abruptly end the game. This is a bad feature. Beginners, in particular, will find their games lasting just a few seconds.

If you have a light rifle and are keen to get some programs for it, then Cosmic Commando may suit you. However, joystick users will probably not find the game worth while.

### 3D Timetrek

3D Timetrek is a fairly standard Star Trek game. Klingons are scattered randomly throughout the galaxy, and your mission is to track down and destroy them. The galaxy is made up of 64 quadrants, and you navigate between them simply by entering the co-ordinates of the quadrant you wish to visit.

Unlike some Star Trek games, there is no movement within a quadrant. However, if there is a Klingon present, you enter a special battle phase: the Klingon bobs around the screen blasting at you and you use the joystick to blast at him.

The battle phase is an interesting addition to the game, but otherwise 3D Timetrek is no better than the two Star Treks already available in the public domain. 3D Timetrek has merely taken the well-worn Star Trek theme and added some graphics and sound.

Although I enjoy Star Trek games, I do not like 3D Timetrek. First, there is a problem with the input routine.

Sometimes you have to press a key several times before the computer picks it up. Second, there is a lack of control in the battle phase. Hitting a Klingon is more a matter of luck than skill. Third, sometimes the game says you die because of your wounds even when you have no wounds.

If you are interested in this sort of game, don't bother getting 3D Timetrek. Save your \$25 and get a Star Trek from the public domain.

### Stellar Triumph

Stellar Triumph is a good two-player game. Each player guides a ship around the screen and tries to blast his opponent. Effective use is made of high resolution graphics although some of the shapes are rather inartistic. There are also some simple sound effects.

The best thing about Stellar Triumph is that you can alter many of the game's parameters. These include length of game, type of boundary, inertia, thrust, fuel, missile velocity, firing rate, number of missiles, type of sun, strength of gravity, and number of foreign objects. Each player can also select whether he uses a joystick or the keyboard for controlling his ship.

This large degree of flexibility allows you to design a wide range of games. It is possible to create a game which can comfortably be played by quite young children. Or, you can design a game which taxes the reflexes of the most hardened video addict.

Unfortunately, Stellar Triumph has two shortcomings. First, it needs a better set of instructions. As it is, some beginners will have trouble figuring out what's going on. Second, it should have a one-player option. At present you can select for a third ship, which the computer controls. It shouldn't have been two difficult to design an option where a single player plays against the computer's ship. However, as it is, Stellar Triumph can only be played by two players.

### Competition

The winner of May's competition was David Lynch, of Wellsford. David has been sent a copy of Pottit (donated by Alpine Computing).

The prize for this month's competition is a cassette tape of Skramble (donated by Alpine Computing). Entries close on July 25. Only one entry per person.

Your task this month is to write a program which turns the 64 into an egg timer. The user enters the number of minutes he wants timed, and the computer sounds an alarm when the time has elapsed. Send the program with your name and address to Skramble Contest, P.O. Box 201, Alexandra.

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## Some more routines

By Philip Middlemiss

In the Dick Smith VZ200 there are a number of new routines which can be used by the use of simple BASIC commands. These routines are:

- 1: Defint x (defines variables listed as integers).
- 2: Defdbl x (defines variables listed as double precision).
- 3: Auto: (auto line numbers).
- 4: Print Mem: (prints the memory available).
- 5: On x GOTO line1, line2, etc.
- 6: Delete (deletes a block of BASIC program).

All of these routines must be used with a line number, and under most circumstances should be typed before

any other program lines are typed in.

If a program is already in the computer and you want to add one of the above routines then put the line right at the beginning of the program with a GOSUB or GOTO routine in the line where you want the routine to be used. (See example A).

When the routine is put into the computer you must use a line number lower than any existing line number already in the computer.

When you LIST your program you will see the line number only, with nothing after it, so editing this line is not possible. The reason that the line is blank is that in the VZ200 ROM there are no BASIC words for these routines.

Here are the instructions for each routine. Don't type that which is enclosed in ( ).

(DEFINT X) (X can be A,B,C, etc or A-L etc).

```
10 PRINT A,B
POKE 31469,153
```

Then type rest of program.

```
(DEFDBL X)
10 PRINT A,B,C
POKE 31469,155
```

Then rest of program.

When these variables are found in your program they will automatically be used as integers or double precision as programmed.)

(AUTO) (to generate AUTO line numbers 10-20-30-40, etc).

```
1 PRINT
POKE 31469,183
RUN
```

(To generate AUTO line numbers starting at, say, 500 with steps of 20).

```
1 PRINT 500,20
POKE 31469,183
RUN
```

(The first number is the start number, the second is the step between numbers).

When AUTO is finished with remove line 1.

```
(PRINT MEM)
10 PRINT X
POKE 31470,200
```

RUN

(Also see example A.)

```
(ON X GOTO (OR GOSUB)
100,200,300)
10 POKE 31469,161
```

(For use see example B.)

(DELETE)

(After a program has been loaded and is working you sometimes need to remove a block of program that is no longer needed or needs to be replaced.)

```
1 PRINT 150-300
POKE 31469,182
RUN
```

(In this example lines 150 to 300 will be deleted.)

Example A

When the routine is required in the middle of a program use as this example.

```
2 PRINT X:RETURN
POKE 31470,200
1 GOTO 10
10 (rest of program)
```

When memory available is required in the program use: Line no GOSUB 2.

Example B

In the ON X GOTO routine, when X = 1 the program will branch to the first line No., and if X = 2 then the program will branch to the second line No., etc. Here is how it can be used.

```
70 PRINT X GOTO 100,200,300,400
POKE 31469,161
10 INPUT "ENTER TWO NUMBERS",a,b
20 PRINT "ENTER 1 TO ADD"
30 PRINT " 2 TO SUBTRACT"
40 PRINT " 3 TO MULTIPLY"
50 PRINT " 4 TO DIVIDE"
60 INPUT X
80 (continue with rest of program)
```

Other words decide where this line is to be, give it the correct line number. But type it in first followed immediately by its POKE statement. You could also use it as example A. You could do it this way:

Type IN PROGRAM B, replace line 70 with GOTO 2 and then add:

```
2 PRINT X GOTO 100,200,300,400
POKE 31469,161
1 GOTO 10
```

If two or more of these routines are required type as below:

```
5 PRINT A,B,C
POKE 31469,153
4 PRINT X,Y,Z
POKE 31469,155
```

This will make A,B,C variables integers and X,Y,Z variables double precision. These lines can be typed in after the program is loaded as long as line numbers lower than five have not been used.

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# Re-defining the entire character set

By Gary Parker

The Spectrum has 21 user-definable characters, which can be changed to any shape by re-defining the matrix of eight-by-eight pixels which each character is constructed of. Spectrum users will know how to do this from chapter 14 of the Spectrum Manual.

Although not many people realise it, the Spectrum allows more than four times this many characters to be re-defined.

The normal character set is stored in ROM (read-only memory), and cannot be changed. However, the computer has to know where to find that set of characters, and to do this it looks at a system variable called CHARS, which stands for character set. CHARS points to where the character set is in memory, and since CHARS is in RAM (random-access memory, which the user can change), it can be POKE'd to point to a new character set defined by the user. The procedure is really no more difficult than defining the normal user-defined graphics.

First, you must make a new character set somewhere in RAM. This could be anything, from a Greek alphabet to a fleet of Space Invaders. Then you must alter CHARS to point to your new character set.

CHARS consists of two bytes, and points to an address which is actually 256 bytes less than the address of the first useable character, which is the space character, code 32. (The characters and their codes are listed on page 135 of the Spectrum manual.)

The first byte of CHARS, which is at address 23606, contains the "least significant byte", and the second byte, at address 23607, contains the "most significant byte". To work out what number is stored in CHARS (or any system variable, for that matter), you must multiply the contents of the second byte by 256, and add it to the contents of the first byte.

Try it out: turn on your computer, and do this:

```
PRINT PEEK 23606 + 256 * PEEK 23607
```

The answer will be 15360. Since the number held by CHARS is 256 less than the start of the character table, this means that the normal character set starts at address  $15360 + 256 = 15616$ .

Now say that we have a new character set stored at address 30000. What will we have to POKE CHARS with so that it will point to the new characters? First subtract 256 from the starting address of your character set:  $30000 - 256 =$

29744. Divide this by 256:  $29744/256 = 116.2$  POKE address 23607 with the integer value of this:

```
POKE 23607,116
```

Next, multiply that integer by 256, and subtract the answer from the address:  $116 \times 256 = 29696$  and  $29744 - 29696 = 48$ . Put that number into address 23606:

```
POKE 23606,48.
```

So that would make CHARS point to a new character table to address 30000.

Since this replaces the normal character set completely, your program listing will look different. If you have made CHARS point to a set of Chinese characters, for instance, then your program will contain nothing but Chinese characters. This can be useful if you want to protect your programs by rendering them unreadable, but it is a pain in the neck if you're trying to debug them! Try this if you want to see what I mean:

```
10 REM unreadable program
```

```
20 POKE 23606,0
```

```
30 POKE 23607,0
```

Run this and list your program. What a mess! To get it back to normal, either switch the computer off and on again, or POKE CHARS back to normal with

```
POKE 23606,0:POKE 23607,60
```

## BUILDING YOUR OWN CHARACTERS

The easiest way to make your own characters is to use a character generator program. You could modify the one that comes with the Horizons tape. Otherwise you can POKE the memory with numbers, just as you do with normal user-defined graphics.

Often, you just want to make a slight change to the normal character set, and the fastest way to create a new character set is to copy the normal one into RAM, and then modify it.

Here is a short routine which will copy the normal character set, from the space character (code 32) to the copyright symbol (code 127), into RAM, and then alter CHARS to point to it. The new set is stored at address 30000, which is suitable for both 16K and 48K Spectrums.

```
10 REM transfer character set
```

```
20 CLEAR 29999
```

```
30 FOR k = 30000 TO 30760
```

```
40 POKE k, PEEK (k - 14384)
```

```
50 NEXT k
```

```
60 POKE 23606,48 : POKE 23607,116
```

If you LIST the program after running it, all will look normal, but actually the computer is now using the new character set in RAM instead of the one in ROM. Now you can modify this character set. For instance, you might want all the characters to be underlined. Add this routine and then use GOTO 100:

```
100 REM underlined characters
```

```
110 FOR k = 30007 TO 30760 STEP 8
```

```
120 POKE k,255
```

```
130 NEXT k
```

After a couple of seconds, the program will finish running. LIST it, and all the characters will be underlined.

Another thing you could try is to make all the characters appear upside down:

```
100 REM upside-down characters
```

```
110 FOR k = 30000 TO 30760
```

```
120 FOR m = 0 TO 3
```

```
130 LET t = PEEK (k+m)
```

```
140 POKE k + m, PEEK (k+7-m)
```

```
150 POKE k + 7 - m, t
```

```
160 NEXT m
```

```
170 NEXT k
```

Use GOTO 100, and after about eight seconds the program will finish running, and you can LIST it to see the effect.

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## Four games for \$29.50

"The Arcadian." Four games on cassette tape for the 16K or 48K Sinclair Spectrum by J.K. Grege Software. Retail price \$29.50. Reviewed by Gary Parker. N.Z. agents for this software are Micro '81, Box 80-075, Auckland.

Four games for less than \$30 sounds like good value, so I was interested to see whether the quality of the games on The Arcadian was comparable to those sold separately.

The first game on the tape is Invasion, which is, predictably, yet another version of Space Invaders. This one is reasonably similar to other versions available. The invaders are colourful, but rather small. Your ship moves smoothly and is easy to control, and the game becomes increasingly difficult as the game speeds up. The sound is limited, and while the game is good, it does not quite match the other versions which are sold separately.

Kamikaze is loosely based on the arcade game, Scramble. You fly a spaceship through a sideways-scrolling cave, shooting and bombing rockets, mines, and fuel dumps. If you fail to destroy the fuel dumps, you run out of fuel and crash.

This version has two speed levels, and very good graphics. The movement is slightly jerky, but your ship is easy to control. While this version is a little simpler than other versions I have seen, it is great fun to play, and I recommend it.

Minefield is a very simple game, written in BASIC, in which you must move around the screen, leaving a trail, until finally you hit a tree or your own trail. The best part of the game is the tune, "The Teddy Bear's Picnic," which is played at the beginning.

UFO is another simple game. Various-size asteroids move up the screen, and you move a space ship left and right to avoid them, and shoot aliens as they appear. The graphics and sound of this game are reasonable, but movement is

slow and jumpy. Small children may find this a good introduction to computer games, but as with Minefield, listings for games like this are often available in magazines.

In conclusion, Invasion and Kamikaze are good, but Minefield and UFO are disappointing. Since you are getting two good games for the price of one, I still consider this tape good value for money. It should be high on the list of anyone thinking of buying a first tape for their Spectrum.

## Monopoly version

By Steven Cragg

Go to Jail is a computerised version of the board game, Monopoly. The game is played with two or five players and it has the option for the Spectrum to play as one of the players.

The graphics on the game are good with some very impressive sideways scrolling, but the flashing border display whenever you land on a Chance or Community chest square is inclined to be annoying. The display for the game is a little hard to follow at first as there is no over-all view of the board. Instead you are confined to a view of the square you are on plus the two squares in front of your counter. Finding out who owns what can be a little tedious, but as the computer automatically calculates the rent whenever necessary (no cheating in this game) this is not really a major problem.

The documentation is confined to the cassette inlay and although on the whole well written, they do expect a certain amount of familiarity with the rules of Monopoly.

In all this an impressive implementation of a very popular board game and its nice graphics coupled with the facility to play against the computer make this a good buy.

Go to Jail is supplied on tape for the 48K ZX Spectrum and costs \$24.95. N.Z. Agents are Software Supplies, Box 865, Christchurch.

## Tank battle

3D Combat Zone. The scenario for this game is that you command the sole surviving member of the home battle tank fleet and must wander around a wasteland littered with pyramids, trying to kill (and defend yourself against) enemy tanks, flying saucers, and the dreaded supertanks.

The game gives you a display with a radar screen at the top of the display and a large set of sights in the middle of the screen. The idea is that you try and move your tank so that you have him in your sights, then you shoot one of your never ending supply of shells at him to try to destroy him. This sounds easy, but believe me it is not. For a start, the enemy moves out of the way so you have to be really close before shooting to ensure a hit. Also there is the problem of the enemy shooting back. In this game it is possible to lose all three lives without ever seeing the enemy you are trying to destroy.

The graphics for this game can only be described as excellent, all objects being shown in 3D "wire graphics" which are so good that it is almost worth buying the game just to see what can be achieved on a Spectrum.

3D Combat Zone is supplied on tape for the Spectrum 48K and costs \$24.95. N.Z. Agents are Software Supplies, Box 865, Christchurch.

## The missing paragraph

The Spectrum article in the June issue of Bits & Bytes, about music on the Spectrum, by Gary Parker, was missing a paragraph, which meant that some instructions on how to use the Music Maker program were omitted. Here is the missing paragraph. It should have appeared about a third of the way down the centre column, above the paragraph that begins, "Here are some examples":

Here is a program which allows you to enter music into the Spectrum in much the same form as it is normally written; by specifying each note as a letter. Type in the program, SAVE it, and RUN it. You will be asked to enter the duration of each note, followed by the note itself. The duration is in hundredths of a second, so for example, enter 10 for a tenth of a second. Very short durations such as 0.5 will produce drumbeats. The note should be a small letter a to g. This may be followed by a sharp sign (#), and then a positive or negative number specifying the octave above or below middle C. The octave around middle C (from the A which is two notes below middle C to the G which is four notes above it) does not require a number specifying the octave.

Our production staff apologise to those readers who were inconvenienced.

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# Up and running

By Michael Fletcher

In this new column I will mostly be commenting on what is happening to Atari in New Zealand and reviewing any new software for the Atari computers.

Atari started in 1978 with the TV game called the Atari 2600. It was hailed as the finest creation brought into the home by video goes. Since this development Atari has grown to become one of the largest marketers of video games, computers and arcade games in the world.

Atari computers have been in New Zealand for about three years. The first Atari computers were the 400's and they cost about \$1300 when they first entered the New Zealand market. Now they have dropped to below \$400.

Recently, as you might well know, the dealership for Atari products has changed hands to Manacō Industries. This company is bringing into the country the brand new Atari XL computers and peripherals.

Atari is at last up and running, and it's about time.

## Preppie II

For all of you who have played Preppie, Preppie II is a must. It utilises the functions of the computer that have made the Atari such a fine games playing machine.

The scenario is set: you are Wadsworth Overcash, the survivor of the immortal nasty nine, freshly out of prep school and into the exciting new life of a college student. But life was never easy, for now Wadsworth must take the near fatal initiation test for the Delta Skelter Omega sorority. As all new pledges know this test is one of the most deadly ever devised by man. The course is simple and sadistic: the new pledges must break into the college buildings and paint the floor in the latest Paris fashions. An easy task you may think. Well you were never more wrong: painting the floor was never harder for in the realms of the corridors lurks the most ghastly menagerie ever thought of by man.

The object of Preppie II is simple: paint the corridors and escape. This is easier said than done. There are three different rooms on each level of Preppie II and there are five levels on Preppie II, so that gives you over 15 rooms to explore.

Preppie II is a maze game. This theme for a software program has really been worn out, especially with the numerous Pac Man variations out for the Atari home computers. Preppie II is really a

surprisingly different maze program.

The object of Preppie II is to paint the maze-like corridors and escape to the next level. On the screen you are a brilliantly animated college student, and to make the job of painting the floors difficult are many harassing creatures who can kill you by merely stomping on you or mowing you over in cars, trucks and motor mowers.

The first and third mazes in Preppie II are filled with frogs that will attempt to stomp on you and kill you, but Preppie has a secret weapon called a cloak. When you push the fire button you turn invisible and cannot be harmed. The one detrimental effect of the cloak is that it only has a limited amount of use.

The second room is fairly similar to the motor mowers and car segments in Preppie I. Room two is a row of parallel corridors and between the corridors run cars and motor mowers and they will attempt to hack you down and kill you.

Once you have completed the first three rooms an enjoyable prelude opens the beginning of the next level.

I found Preppie II very enjoyable and entertaining. It has well presented graphics and excellent music, as usual. The game play is exciting and often amusing, especially when you are stomped on by a frog. This game is 16K on a tape and 32K on a disk.

Rating (out of 15): graphics 13, originality 11, game play 13, over all 12. (Price not supplied. Ed.)

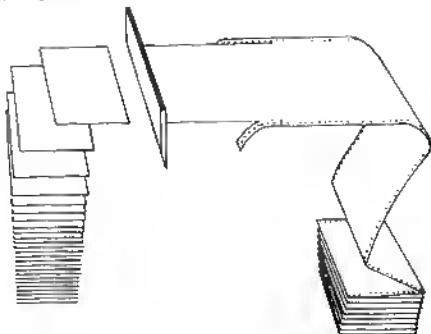
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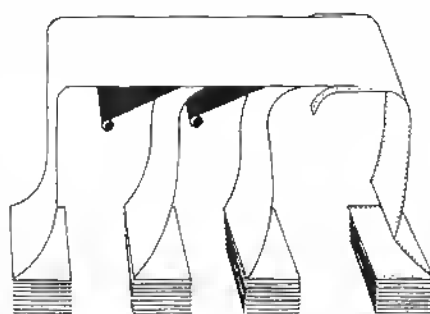
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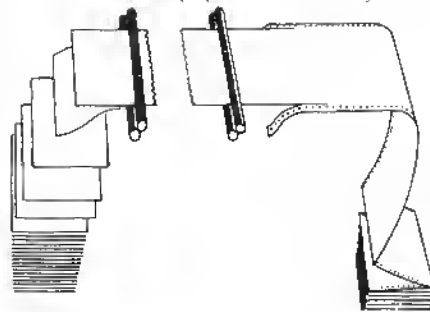
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# Sound on the ZX81

By P. Passuello

Many people believe that the ZX81 is unable to produce sound. I have produced a 19-byte, machine-code program to produce sound of a quality equal to that of the Spectrum. To listen to these sounds you use your cassette recorder with the leads put between the recorder and microphone socket and the ZX81 microphone socket.

Leave out the ear-plug on the tape recorder and in that socket you may put an earphone. When the program is running, put an old tape in your recorder and set it to record.

You can listen through the earphone, or rewind the tape and listen to that. Here is the program:

```
10 REM .....
20 LET A$ = "1600CD230F0E000DC289
40CD2B0F15C28440C9"
30 FOR A = 1 TO 38 STEP 2
40 POKE 16514 + INT (A/2), (CODE A$(A)
-28)*16 + (CODE A$(A+1)-28)
50 NEXT A
```

Note — REM must have more than 20 dots in it. A\$ holds the machine code to be POKED in, and it is only 38 characters in length. Do not leave any space in between them. To check, count them.

Run the program and when it finishes delete lines 20, 30, 40 and 50. This will leave you with line 10 to stop loss, then type in POKE 16510,0. It will prevent you from editing and changing this line.

One more job remains to be done. The ZX81 has two versions of the 8K ROM, and this program will only work on one of them as it stands, so you must work out which you have. This is done by typing in, in slow mode:

Rand USR 3872

One of two things should happen: either the screen shows 0/0 and you are in fast mode, or it will show 8/0 and you are in slow mode. If the last of these two happens you are ready to run the program. However, if the first of these two occurs you must make a small change. Type in:

```
POKE 16517, 32
POKE 16518, 15
POKE 16526, 40
POKE 16527, 15
```

The program is now ready to be run:

To run, type in:  
10 RAND USR 16514  
and run.

This will give a short note. To make it longer add  
20 GOTO 10

This will sound the note over and over again with a small break in between.

To change the note type in

```
POKE 16520, N
```

N = any number between 0 and 255.. The higher this number the lower this note will sound (0 = 256). You will find only 17 different notes so N should be

one of these numbers: 5, 21, 37, 53, 69, 85, 101, 117, 133, 149, 165, 181, 197, 213, 229, 249, and 0.

Much can be achieved with this short program and it should be possible to make music and sound effects with it.

## Random Numbers

This program, by Peter Anderson, of Hokitika, picks a whole number between one and 100 and asks the player to guess it. The game can be made harder by changing lines 6 and 20 to:

```
6 PRINT "BETWEEN 1 and 100"
20 LET N=(INT)RND*100)+1
```

```
7 INPUT A
PRINT
LET N=(INT (RND*100)+1)
IF A=N THEN GOTO 30
IF A<N THEN GOTO 50
PRINT "YOUR ANSWER IS CORRE
CT"
GOTO 51
IF A>N THEN THE ANSWER WAS "N
PRINT "PRESS Y FOR ANOTHER
TRY"
INPUT AS
IF A$="Y" THEN GOTO 4
IF A$<>"Y" THEN GOTO 20
PRINT "GOODBYE"
```

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## Golf

This game by Kevin Clark, of Kilbirnie, Wellington, requires the player to estimate the correct force to drive within the range 35-75. If you miss you are allowed further shots until you finally drop the ball in the hole.

Enter a number between 35 and 75 for the driving force and then press NEWLINE. Press NEWLINE for the next round.

Our Sinclair editor, Steven Baker, describes this game as very good. He says that by changing the pauses in lines 240, 260 and 930 to FOR...NEXT loops, some of the screen flicker will be reduced. He also suggests a shorter pause at line 260.

```

110 LET H=0
130 LET P=INT (RND*20+9)
140 LET X=0
150 LET Y=20
160 GOSUB 300
170 INPUT F
175 LET H=H+1
180 LET F=F/2
200 FOR T=F/6 TO F+.01 STEP F/6
210 LET Y=20-F*T+T*T
220 GOSUB 300
240 PAUSE 30
250 NEXT T
255 IF INT (X+.5)=P THEN GOTO 9
260 PAUSE 9999
270 GOTO 130
300 CLS
305 PRINT "GOLF"
310 PRINT AT 21,0;" "
320 PRINT AT 21,P;" "
330 IF X<32 AND Y>0 THEN PRINT
AT Y,X;" "
340 RETURN
900 LET Y=21
910 GOSUB 300
920 PRINT AT 0,0,H;"SHOT"
925 IF H>1 THEN PRINT "S"
930 PAUSE 9999
940 GOTO 110

```

## Typing Practice

This program probably needs 16K, says the author, Alistair Matthew, of Wellington. His notes on the lines:  
5-15: set up variables

15: sets up letters for typing  
20: prints heading  
25: picks random letter from line 15  
30 and 100: increase variables  
50: sets time for typing  
20: checks whether the player got the right letter  
110: prints the score.

**Game instructions:** When a letter or a number is printed on the screen you must type that letter in as quickly as possible, but do not press RETURN. In line 20, the box around typing practice, means do it in reverse.

**Footnote:** The inverse letters in the listing, line 20, read: TYPING PRACTICE.

```

5 LET T=0
10 LET S=0
15 LET W$="1234567890QWERTYUIO
PASCDFGHJALZXCVBNM"
20 PRINT AT 3,9;"TYPING PRACTICE"
25 LET Y$=W$(INT (RND*37+1))
30 LET T=T+1
40 PRINT AT 11,15;Y$
50 PAUSE 200-T
70 IF INKEY$<>Y$ THEN GOTO 180
100 LET S=S+1
110 PRINT AT 21,15;S
120 GOTO 25
180 PRINT AT 19,5;"YOU ARE WRON
G.IT WAS ";Y$
200 STOP

```

## Number Guess

This is a game by Alistair Matthew, of Wellington.

**Instructions:** When the reverse L appears type in a number between the two numbers that appear on either side of the X. These numbers represent the high and low boundaries of the number to be guessed. To stop the game type in STOP (shift A).

Alistair supplies these program notes:

1-40: Set up variables  
40: Picks random number  
50-60: Print heading, etc  
90-105: Plotting points for turns taken

110: Check whether input is correct  
150-200: Congratulations routine

Steven Baker, the Sinclair editor, says these and other games supplied by Alistair are good efforts, and refreshingly different from the arcade-type games usually submitted for publication.

```

1 LET H$=0
10 LET T=0
20 LET N=INT (RND*101)
30 LET L=0
40 LET H=100
50 PRINT AT 3,8;"GUESS MY NUMB
CR"
55 PRINT AT 1,1;"BEST SCORE =
";H$
60 PRINT AT 11,9;L;"X=X<=";H;"
70 INPUT X
80 LET T=T+1
90 FOR Q=1 TO T
100 PLOT 0,(T-1)*3+1
105 NEXT Q
110 IF X=N THEN GOTO 150
120 IF X>N AND X<H THEN LET H=X
130 IF X<N AND X>L THEN LET L=X
140 GOTO 50
150 PRINT AT 15,5;"YOU GOT IT I
N ";T;" GOES"
160 PAUSE 150
170 IF T<H$ THEN LET H$=T
200 GOTO 10

```

## Star Capture

This game for the 1K machine is by Philip Dewar, of Christchurch. The player has to steer through a maze of asteroids and hit question marks for bonus points. Use key A for left and key L for right. To make the game longer, change the value of 300 in line 10.

```

5 LET X=VAL "10"
7 LET Y=X
10 FOR J=1 TO 300
12 SCROLL
14 PRINT TAB AND*20;"X",AT 1,Y
16 LET P=PEEK (PEEK 16390+256*
PEEK 16395)
18 IF P=CODE "X" THEN GOTO 100
20 IF P=CODE "Q" THEN GOTO 70
40 PRINT "X"
42 LET Y=Y+(INKEY$="L" AND Y<1
9)-(INKEY$="A")
44 IF INT (RND*4)=5 THEN PRINT
AT 20,AND*20;"Q"
45 NEXT J
46 PRINT "WELL DONE"
48 PRINT "YOUR SCORE: ";X+J
50 STOP
52 PRINT "BONUS +"
54 LET X=X+100
74 GOTO 42
100 PRINT "CRASHED"
102 GOTO 48

```

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## 'Specs' – how to read them

By Gordon Findlay

Reading computer specifications, say in a magazine review, or advertisement, can be a difficult experience. Not only are they often full of jargon, but the things that are not said may be more important than those that are!

Let's look at some of the common items to be found in an advertisement and see what they mean.

Memory size is often the most conspicuous item mentioned in advertisements. As you know, memory comes in two (main) types: ROM and RAM. In a microcomputer, ROM is the permanent memory, holding the computer's operating system and language translators. Generally, ROM sizes are quoted in K, short for kilobytes. A kilobyte is 1024 bytes, or elements, of the memory. The larger the amount of ROM, the more powerful the language translator and operating system *ought* to be.

The RAM, or useable memory, is much more interesting. This is where your programs and data will reside. Again, RAM size is measured in K. But be very careful here! Some RAM is commonly used by the computer for the video display. This may vary, even in the one computer, with the graphics mode selected.

The really significant figure is the amount of RAM available to the BASIC (or other language) program. This may not be easy to find out. Even in some of the larger machines with 128K or 256K of RAM, BASIC may be restricted to less than 40K of RAM. Of course, the whole lot is available (apart from screen use, and the portion required by the operating system) to machine-language programs. This may not worry you if you don't intend to either write programs or use a lot of data at once.

Adding a disk drive will usually reduce the amount of RAM available to you, as the operating system takes some for its own use – for example 10K is required for the Apple DOS (disk operating system).

Graphics are of major interest. Some advertisement writers don't know the difference between *sprites* and *shapes*, as I suggested in June. Some don't know the difference between a *colour* and a *shade*. Atari claims 16 colours, with 128 (or 256) luminance levels. Some (independent) advertisements have quoted 128 colours.

Be careful, too, to read carefully, for the number of colours you can display at once on the screen. Can every colour appear at every point, or are there

restrictions? Is the claimed resolution attainable, or is it some theoretical resolution, with only some particular "characters" or shapes able to be plotted, rather than individual pixels.

Sound "channels" or "voices" are subject to a lot of confusion. Software support, particularly in the shape of BASIC instructions, is the most important thing. Look for easy-to-use commands rather than some particular hardware device characteristics.

The differences between microprocessors are of little importance to the first computer buyer. In the microcomputer field the fact that a Z80 processor has a lot more registers than a 6502 is not often relevant. Certainly, a machine-code programmer will need to take the processor into account – but not the beginner.

Of course, 16-bit processors are inherently more powerful than 8-bit, and 32-bit are even more powerful, but it is the software (operating system and languages) which really make a difference to the user and programmer. Anyway, it is becoming very hard to say what a 16-bit processor is – at least in ads!

Clock rates are often mentioned – quoted in MHz (megaHertz). This is the rate of the fundamental "heart beat" of the computer. You can pretty much ignore it. A higher clock rate does not lead inevitably to a faster computer. Once more, it is the language interpreter and operating system which determine the speed over all.

So what about the language (or languages) available? There are vast differences in power and ease of use between BASICs. The larger the list of commands the better you might think, but are the commands easy to use? Do they do what you think they do? Check what they mean first! Allied closely with the language are the editors and so on used to write the program in the first place. Some are more limited than others. One machine which I used for several months had a very powerful and easy to use BASIC, with an editor which wasn't much better than a quill pen! Of course, there are software additions to give better facilities in many cases.

Another caution: when you read that a computer has an RS-232 port, check that it will drive whatever you are trying to connect! Only a physical check is foolproof.

### Disk conversion available

A handy service now being offered by Solstat Industries (P.O. Box 13-183, Christchurch) is the conversion of disks from one format to another.

For \$20 and the cost of a disk, Solstat will convert, for example, any CP/M disk to MS-DOS.

Altogether 70 5¼ inch formats are available and all variations of 3740 8-inch formats.

## Of screens and RAM

By Gordon Findlay

Sometimes we forget that the TRS-80, or System-80, screen is "memory mapped", or, in other words, simply displays the contents of a block of the computer's main storage, or RAM. The reason for using a memory-mapped screen in the first place was for simplicity. A computer without such memory mapping needs some sort of terminal, driven through a serial or parallel link, which is much more complex to implement.

The early micros almost all used some form of memory mapping for the screen display. Some are rather more convenient than others. For example, the Apple, with its interleaved lines, is not as easy to apply some techniques to as the '80, which has one simple block of RAM for consecutive screen lines.

Because the screen is RAM, information can be read from the screen simply by PEEKing. The earliest word processing programs, and many of the latest, made use of the screen in this way. As characters are typed in, they are displayed directly on the screen. When something else must happen, such as scrolling up at the end of a line, the text can be read from the screen, and placed in RAM (ordinary RAM that is). Users of Electric Pencil will have noticed this happening at the end of lines. EP has an annoying habit of dropping characters – it doesn't receive characters typed while the end-of-line re-organisation is going on.

The memory-mapped screen is a natural for systems based on the Z80 microprocessor. The Z80 was the first to include powerful block handling instructions on chip, especially the block moves, LDIR and LDDR, which take care of moving blocks of RAM quickly and automatically, obviating the need for writing (and correcting!) complex loops.

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## TRS80/SYSTEM 80

The screen of your 80 can be manipulated in many ways using simple moves. Screens may be saved for later use, such as a HELP screen. They may be set up in advance in another region of RAM; they may be reversed (black for white and vice-versa) by changing it byte by byte. The top part of the screen may be duplicated in the bottom — you've probably seen games using such moves. Even the scrolling of text — a fundamental part of the operating system — is handled in this way (at 0553H in the ROM).

As well as being used in this way, the screen has another important technique associated with it. Sometimes it is easier to display something than to access it directly (from BASIC, say). A classic example is a directory of files on a disk. This may be displayed easily enough on the screen, but is not so easily obtained from within a BASIC program. But wait — if we can obtain a directory from within our program, we can perhaps "interrogate" the screen to find out what is on it. This is easily done from BASIC by PEEKing each character in turn, and building them into a string.

We need to know several things to do this. First, we must be able to do the equivalent of the DOS command, "DIR", from within a program. In many operating systems, NEWDOS, MULTIDOS, and DOS PLUS among them, this is accomplished with CMD

"DIR" (or CMD "DIR=1" if you wish to specify another drive). Model III TRSDOS has the equivalent CMD "D=0" — the drive number must be included. There is no equivalent in Model I TRSDOS (another reason to avoid it!).

We need the screen lay-out of the directory. In NEWDOS80, the first file name occurs on line three of the screen, in the left-most column. Four files are listed per line. In MULTIDOS, the DIR command puts the files on the screen in three columns rather than four; starting on the fourth line. The file attributes are included, and need to be skipped over. Using CAT, the file names start on line 5, in four columns without the attributes. ZDOS is similar to MULTIDOS. Whatever you use, check where the file names occur!

Now we need the actual locations in RAM which are screen locations. It is commonplace that the screen occupies locations 3C00H — 3FFFH in both the Model I and Model III. Hex numbers are much easier to use when discussing the screen, and can be used (in the form &H3C00 directly in disk BASIC), but I will mention the decimal equivalents occasionally (3C00H is 15360, 3FFFH is 16383). The first line is just the first 64 bytes of this block — 3C00H to 3C3FH (15423). The contents of the first space on the first line may be obtained by the statement, X=PEEK (&H3C00), or the equivalent X=PEEK (15360). Of course,

X is a number — the ASCII code for whatever character is on the screen. If the screen displays 'A', X will be returned '65'. If the screen is blank, X is 32.

Now we can get a file name from the screen! We start (in NEWDOS anyway) at 15488. A file name is, at most, 12 characters long — eight for the file name, three for the extension (if any), and 1 for the '/'. We PEEK along from 15488, remembering to convert the number returned to a character using CHR\$( ), and joining the results together:

```
10 F$="" : REM start with nothing
15 X=15488
20 Y=PEEK (X)
25 IF Y<7 32 THEN F$=F$+ CHR$(Y):
X=X+1 : GOTO 20
30 ... blank found — end of file name.
```

This gives the first file name. You can expand on this to read all the file names, into an array perhaps.

Information can be placed on the screen, using POKE.

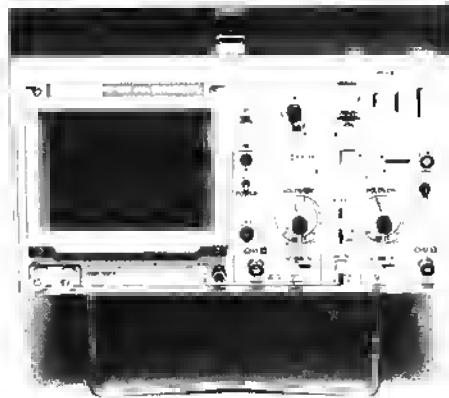
POKE &H3C00, 65 puts an 'A' in the top left corner of the screen, without altering anything else on the screen.

Next month, I will take up this idea, now that we have covered the basics. This technique can be used to get files from several disks for a master index; or to get the files from one disk to print to a label. More next time.

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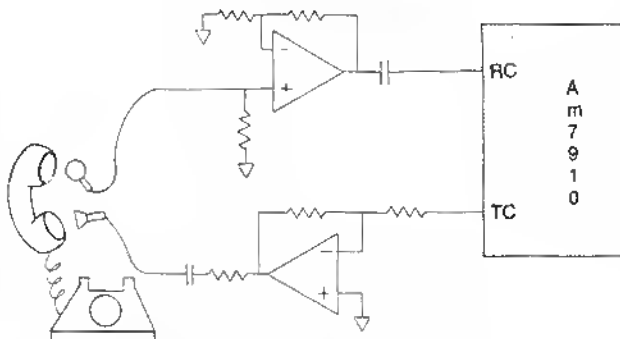
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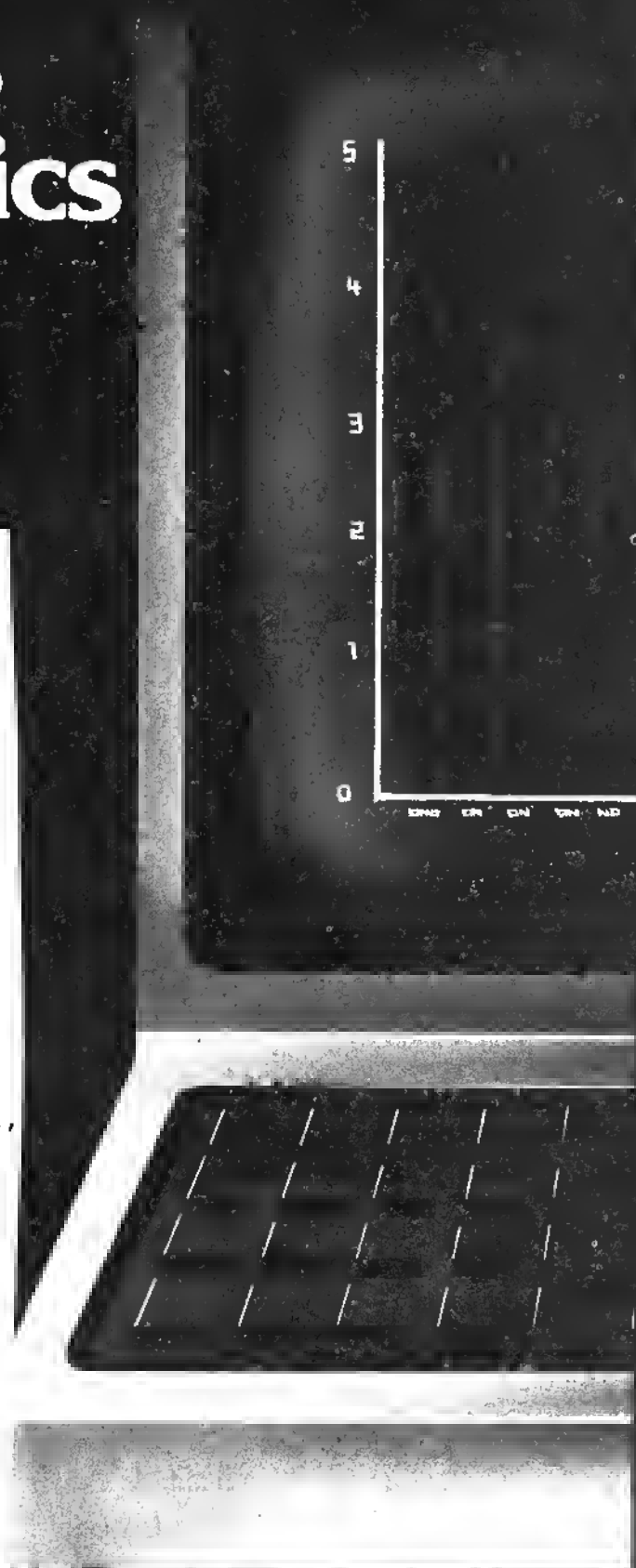
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# The second processor arrives

By Pip Forer

A long time ago, seemingly in a galaxy far away, I characterised the BBC micro without disks and extra memory as a Ferrari stuck in a carpark: a top machine in its eight-bit division but with unfulfilled potential. Disks have tapped some of that potential already. Now, at long last, the open road is unfurling further. The 6502 second processor has arrived. It is not yet a cheap option — the current recommended price is \$880 a unit — but it does significantly extend the capabilities of the BBC computer.

The unit comes as a matching box, which sits extremely neatly alongside the main keyboard. It contains a 6502C running at 3 MHz plus 64K of RAM and its own ROM with the Tube operating system inside. It has its own power supply and switch, plus a short length of ribbon cable for attaching to the BBC Tube port.

The product is an interesting one with some good and some quirky features. It is certainly powerful. Acorn claims it can outperform any 8-bit product and all 16-bit machines on the British market running BASIC (except the Sage). That may or may not be advertising hyperbole. I was impressed, however, to run it alongside a standard BBC machine with a contour drawing program. The time to construct a contour map of the area around Lake Moana in Westland using the second processor was only 48 per cent of the time without it. That compares favourably with published comments that it can "almost double" normal processing speeds.

The second processor works by relegating the normal BBC machine to an input-output processor. This handles all the disk work, serial, and other port work and graphics instructions while the

second processor simply crunches through the main program. Since it runs faster than the main processor and delegates these tasks to its minion, performance increases significantly.

The two processors co-operate through the Tube using a series of little-documented FIFO (first in, first out) buffers. These require operating system and scratch space in both units. In the main machine this is assisted by the replacement of the separate sideways ROMs for disks (DOS) and network (NOS) systems by a combined DOS/NOS ROM which comes with the processor. This offers some improved routines plus an extra free ROM slot. The only cost is that when you are *not* running the second 6502 your default PAGE setting is &1B00, higher than a machine just coming up with DOS.

In the second processor (SP), the Tube operating system is held in ROM and fed across to RAM on power up. BASIC is also fed across into the SP on power up, only this comes from the main processor board. You have two versions to choose from. Apart from the standard BASIC there is a new ROM for HIBASIC. The reason for this relates to the memory maps of the combined machines. With an SP the screen memory is still held in the main machine, as is the operating system. Hence my copy of View wordprocessing now shows me with 32000 bytes free in spite of being in Mode 0. The SP copies the default language (usually BASIC) across into its RAM at the same address it occupied in the main processor.

With this arrangement you get almost 32K of RAM free for BASIC below the BASIC code, but there is an inconvenient area of unused memory above the BASIC interpreter. You can actually use this to store variables by setting LOMEM above hex C000 and HIMEM just below the Tube work space at the top of the RAM (&F800). HIBASIC offers a far more palatable alternative. You can simply load this new BASIC to the top of RAM, leaving almost 45K free for programs and variables in one block. Incidentally this new ROM is BASICII compatible so for some owners represents an upgrade. The SP manual details the enhanced features.

## LANGUAGE ROMS SAVED TO DISK

You may feel that this new ROM is all very well, but bang goes the ROM slot just gained by the DOS/NOS chip, and in any case, two BASICs in at one time may confuse the machine. The good news is that *any* language ROM can now be saved to disk and uploaded to the second processor when wanted. Although some language ROMs will not work across the Tube all Acorn languages and many others still will. This means that for infrequently used language ROMs you can free up their slots, too.

For the moment I have opted to keep View and BASIC in ROMs, but I have dropped HIBASIC to disk until such time as I need it for larger applications. One expects that future languages for the BBC will be based on disks loading to the top of free SP memory such as HIBASIC.

Meanwhile, other things are happening down in the main processor. All the character set is exploded, allowing space for re-definition of the entire character set. This offers the opportunity for numerous fonts and character sets loadable from disk. Experience suggests, too, that most utility ROMs work nicely down below. The graphics ROM from Computer Concepts, for instance, works nicely across the Tube. One of its tasks is to reserve space for sprite (shape) definitions that it will then draw on the screen. It now does this under direction from the SP, but reserving space down in the main board: ideal. Other utilities and assembler routines can also be accessed across the Tube using the main RAM still spare below.

How does assembler work and how are the two parallel memories distinguished? The memories are distinguished by a simple convention. With the SP operating the addresses in memory from &0000 to &FFFF represent the SP's RAM. The main (now I/O) processor becomes labelled &FFFF0000 to &FFFFFFFF. Commands to save or load memory such as \*SAVE can specify where the memory must come from by using this convention (for instance a teletext mode screen save is now \*SAVE myscreen &FFFFFFC00+\$400).

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However, operations from BASIC running in the SP (such as ? and !) can still only access the range &0000 to &FFFF, i.e. the SP memory. The Tube can be crossed from BASIC by using calls such as the OSWORD calls 5 and 6 though.

All in all, the 6502 second processor significantly enhances the performance of the BBC and provides sufficient memory for appreciable business software. It is easy to use, and for the programmer offers a simple, plug-in expansion option that will run all existing software, double processing speed and (for 20K graphics modes) increase program space tenfold. As extra languages and software come on the market to utilise this the extension will be even more valuable.

For the moment, the second processor is in short supply in New Zealand, although the British backlog is almost cleared. The first to get the hardware are schools... for running Econet level II. A review of this network in operation will be printed next month.

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## Spec's for modems

By Pat Churchill

The Post Office is preparing specifications for modems for personal computers with a view to relaxing the requirement that all modems be provided by the Post Office.

At present, electrically connected modems have to be leased from the Post Office. With the new specifications, users should be able to buy units of their own for hooking up or for plugging into a jack provided by the Post Office.

The specifications have not yet been finalised, but it is probable that the type approved will have to comply with the New Zealand electrical safety specification NZSS 1300 and with the CCITT recommendation for modems. (The CCITT is a consultative committee dealing with international telephone and telegraph matters and the compatibility and orderly use of telecommunications).

Modems suitable for use in New Zealand will probably have to be tailor-made to local requirements. While modems bought in Britain, Australia, and Europe will generally comply with the CCITT specifications as far as line signalling arrangements and interfacing with a computer are concerned, they would probably require modification to comply with New Zealand's electrical standard specifications. The cost of modification would probably be such that it would not be worth picking up a modem overseas, according to Dave Richards, director of telecommunication services for the Post Office.

For those going the acoustic coupler modem way, the Post Office should continue to have supplies of the present shaped phone for at least the next 10 years. A few of the alternative types also have handpieces that will fit commonly available acoustic modems. The new PERT phones, however, are not suitable.

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# New Zealand Educational Software for the BBC Micro

Barson Computers introduces a new range of educational software for the BBC. These programs have been designed in New Zealand specifically for New Zealand schools and are available only from Whitcoulls Education Branches.

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## BOOKS

# Exploring the limits of the ZX-81

*The Sinclair ZX-81, Programming for Real Applications by Randle Hurley, Macmillan, 164pp \$28.95. Reviewed by Euan J. Davidson.*

Randle Hurley has endeavoured to raise the ZX-81 from the "electronic toy" image which plagues so many of the home microcomputers to the ranks of a real live computer.

He has succeeded in doing this by the use of many short programs which demonstrate that although there are several ways to do the same job with the computer, one is much faster than the others. He has determined — by experimenting — the fastest way in which the machine handles BASIC statements and the shortest BASIC program.

It is quite astonishing to find the time taken by the ZX-81 to execute the multiplication of two by two, 1000 times in a looped program, can vary from one minute and 56 seconds to as little as seven seconds, depending on whether you use "2\*2=4" (one minute and 56 seconds) "2\*2=4" (eight seconds) or "2+2=4" (seven seconds).

Aimed at the more advanced owner, this publication shows how to push the ZX-81 to its limit. As well as describing how to speed up the execution of BASIC programs, full details are given on how to be really miserly in using memory by careful programming, the

advantages of which are faster execution of the total program and shorter LOAD and SAVE times.

The second half contains some real application programs, complete with full descriptions and flow charts useful in business or in the home. The final chapter covers some minor hardware modifications that may be of use.

Although you don't get much change from \$30, this book is good value if you are wanting to find out how to get the most from your machine in BASIC alone, avoiding — for the moment anyway — the need to get involved with machine code programming.

## Useful — if you've a 6502

*"Micro Cookbook: Volume II — Machine Language Programming" by Don Lancaster. Sams 450pp, \$33.50. Reviewed by Ted Brown.*

The first part of this substantial book is definitely machine language programming. Examples start at the very simple level and gradually work up, but not very far. The book purports to be for all microprocessor families but is really I feel, of benefit if you have a machine with a 6502 in it.

Don Lancaster has a way of explaining things pretty well but in this case, he seems to run out of ideas about two-thirds way through the book. After this, nearly 100 pages are given over to hardware interfacing, digital to analog, analog to digital & input/output ports. This hardly fits in with the title but it is very well done and could easily be just as useful as the machine language portion if you own a 6502-based machine and wish to do more with it.

Right towards the end, we find about 20 pages on "how to go about writing a machine language program". This advice would be equally applicable to any programming language. Then we find 11 pages containing 63 ideas to get your teeth into.

Considering the first part of the book hardly takes you through primary school, as it were, I think these are simply fillers. For instance No.4: "How about designing a digital compass the size of a Brunton (whatever that is) accurate to a tenth of a degree and not costing an arm

Turn to page 76

# COMPUTER BOOKS from A.N.Z.

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## Practical Guide to CP/M — Townsend: Dilithium \$32.95.

Follows on from *How to Get Started With CP/M*. An encyclopedia of information to give full extended capability on your CP/M Operating System.

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## BOOKS

and a leg''. Or No.23 'How far are we from direct micro-to-brain interface? Will this be write-only or read-only? Can it work from a distance? How far?'

A bit over-priced perhaps? But a good index and useful for a 6502.

## Value up to user

"Useful BASIC Programs For IBM PC", by Stanley R. Trost.

### TRY OUR LATEST BOOKS FOR THE IBM COMPUTER.

#### ASSEMBLER FOR THE IBM PC AND PC-XT by Abel.

Introduction to assembler language and to 8086/8088 system architecture.  
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#### COMPUTER GRAPHICS FOR THE IBM PERSONAL COMPUTER by Hearn / Baker.

Complete introduction to microcomputer graphics.  
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Sybox, 174pp, \$19.95.  
Reviewed by Gordon Findlay.

This volume contains 65 or more programs and subroutines, suitable for use with the IBM PC, covering a range of fields of application.

These include home and business finance; business programs such as depreciation, wages, commission payments, and finding break-even points; real estate programs such as rental property analysis, mortgage schedules and affordable house prices, among others. Data analysis programs provided moving averages, regression and other statistics, and data plot routines, albeit elementary.

Record keeping programs, to maintain a personal file or automobile file, and mathematics practice programs complete the book, with an appendix giving some subroutines common to several of the programs, and some useful printer subroutines.

Programs are presented in the form of a library of subroutines, to be selected from to build many programs with a minimum of typing. Each program is explained carefully, and a sample run given. Actual screen displays are used whenever possible.

Most of the programs use few specifically IBM features, and none use graphics, so they could be easily adapted for other computers. Most are fairly short. Some readers may find some useful programming techniques - the programs are usually well documented. Whether they are useful or not, of course, depends on the user.

## Games are the thing

Zap, Pow, Boom: 30 Games for your VIC-20 Mark Ramshaw. Pitman, 52pp, \$27.75. Reviewed by Steven Darnold.

This book will appeal to adolescent games-players. It contains listings of 28 games and two demos, all for the unexpanded VIC. There is a good variety of programs, with a strong emphasis on sound and graphics.

Made up of 26 very large leaves stapled together in the middle, the book can be opened out flat - a real advantage when typing in listings. Most of the content is confined to

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I would make a very handsome couple.  
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than indiscriminate.

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a lot of people. My printout capacity of 80  
columns for standard letter-sized sheets  
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But then who am I to brag?

I've got to admit though, my best feature  
is my size...I'll go anywhere with you.  
(I'm also loyal).

Measuring about the size of a standard letter sheet  
and being extra light means I can fit in your  
briefcase. I'm also battery powered...perfect  
for personal computers like hand held and home  
computers.  
I'm also very quiet.

So, that's me!  
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# CLUB CONTACTS

**BBC MICROCOMPUTER USERS' GROUP OF NZ.** Local meetings - Auckland 2nd Wednesday of month at VHE Clubrooms, Hazel Ave, Mt Roskill. Ph. Dawn Fielder, 770-630, ext 518. Wollington - meets last Thursday of each month in self room, first floor, Correspondence School, Portman Cres, Thornton. Local contact, Anica, 286-289. Hamilton - Weikato Tech B block, 1st floor, last Wednesday of the month 5 p.m. Local contacts Peter Ilam 393-990 or Alison (Morningsville) 6695, Hawke's Bay - Hastings and Napier alternate months. Local contacts: Kendall (Napier) 435-624, Bob (Tairāhiti) 446-955, Alrich (Hastings) 778-235. Christchurch - fortnightly, Tuesdays, 7 p.m., Hagley High School. Local contact: Michael, 582-267.

**SHARP PC1500 USER GROUP** - Contact: Allen Thomas P.O. Box 155, Napier. Newsletter.

**KERIKERI APPLE COMPUTER CLUB** - Lessons at the Kerikeri High School 12.20 to 1.15, weekly. Contact: Michael Smith, Landing Road, Kerikeri, ph. 79-581 Kerikeri.

**WHANGAREI COMPUTER GROUP** - Tom Allan, 3 Mauru Rd., Whangarei, Phone 83-063. Meets every second Wednesday of the month at Northland Community College.

**N Z MICROCOMPUTER CLUB** - PO Box 6210, Auckland. A meeting is held on the 1st Wednesday of each month at the OSNZ Hall, 107 Hillsborough Rd, Mt Roskill, from 7.30 p.m. Visitors are also welcome at Micro Workshop 10am - 5pm, at the same hall on the Saturday following the above meeting.

The following user groups are part of, or affiliated with, the N Z Micro Club. Meetings start at 7.30pm at the OSNZ Hall. Those shown with \* are held at the VHF Clubrooms, Hazel Ave, Mt Roskill.

**APPLE USER GROUP** - Ross Byron, ph 761-670. Meets: 3rd Tuesday.

**BBC USER GROUP** - Drive Fielder, ph 770-630, Ext 518. Meets: 2nd Wednesday.

**BUSINESS USER GROUP** - Cathy Anow, phone 491-012. Meetings: 4th Tuesday. \* even months, visits on odd months.

**CP/M USER GROUP** - Kerry Koppert, 2 870 Dominion Rd, Balmoral, Phone 695-355. Meets: 1st Wednesday 9pm.

**IBM PC USER GROUP** - Terry Bowden, ph 452-639. Meets: 7th 9.10.11. Meets: 3rd Tuesday.

**MSX SPECTRAVIDEO COMPUTER CLUB** - P.O. Box 22-620, Dairymilk. Meetings: 3rd Wednesday of month. \* Contact: Bill Ferguson (secretary), ph 276-1966 ext 803.11.

**NZ COMMODORE USER GROUP (AKI INC)** - John Walker, ph 8339 589. PO Box 5223, Auckland. Meetings: 3rd Wednesday, Ramuere Primary School Hall, Dismal Rd, Remuera.

**NZ OSBORNE USER GROUP INZOGI** - Brian Jones, ph 659-738. Meets: 1st Thursday, 20 Kingsley St, Grey Lynn.

**POCKET COMPUTER USER GROUP** - Peter Taylor, 14 Gollan Rd, Mt Wellington 6, phone 576-618.11.

**SINCLAIR USERS GROUP** - Doug Taylor, phone 567-589. Meets: 4th Wednesday.

**SOPCEPER USER GROUP INZI** - Selwyn Anow, ph 491-012. Meets at Minto Workshop.

**SORD USER GROUP** - Gnanne Hall, 5 Broadie Pl, Manurewa, ph 266-8133.11.

**T1 99 4A USER GROUP** - Ray Tanker, ph 568-155.11.

**TOMORROW USERS GROUP** - Chris Cotton, Phone 789-153. Meetings: 3rd Thursday, 7.30pm, 20 Kingsley Street, Grey Lynn.

**WIZZARD USER GROUP** - Richard Mufadgann, 11 Hitting St, Tuwanga, ph 8178-219.11.

**1802 USER GROUP** - Brian Connor, ph 695-669.11.

**2650 USER GROUP** - Trevor Shillfield, phone 876-591.11.

**68XX (X) USER GROUP** - John Kinnorak, ph 606-935.11.

The above notices can usually be found at N Z Microcomputer Club meetings and minor workshops, or via P.O. Box 6210, Auckland.

**Other Auckland-based groups:**  
**ACES** (Auckland Computer Education Society) - C. Director, Computer Centre, Sonenday Teachers' College, Private Bag, Symonds Street, Auckland. Meetings: 3rd Thursday of month, at the College.

**ATARI MICROCOMPUTER USER GROUP** - Ian Mason, 25 Manurewa Ave, Fonesh; Hill, ph 467-347.11. Meets 2nd Tuesday, Western Suburbs Radio Club, 61 North Rd, New Lynn.

**BBC Club** - See entry at head of this list.  
**COLOUR GEM USER GROUP** - (Auckland) - Secretary: Mrs Nola Huggins, Ph 655-7518, P.O. Box 27-387, Auckland 4. Meets every 1st Monday, All Saints Church Hall, Ponsbury Rd, Auckland.

**EPSON HX20 USERS' GROUP** - Contact: C.W. Nighy, 231 Khyber Pass Road, Auckland, (Aansaphone, 774-268).

**HP41C USERS' GROUP** (Auckland) - C. Calculator Centre, P.O. Box 6044, Auckland, Grant Buchanan, 790-328.11. Meets 1st Wednesday, 7pm, at Centre computer, Great South Rd., Epsom.

**NZ TRS-80 MICROCOMPUTER CLUB** - Olaf Skarsholt, 203A Godwin Rd., Tairāhiti, ph 787-8698.11. Meets 1st Tuesday OSNZ Hall, 107 Hillsborough Rd, Mt Roskill.

**OSI BBC USERS' GROUP** (Auckland) - Secretary: Ken Hainy, 77 Bonnyard Road, Auckland Meets 1st Tuesday, VHF Clubrooms, Hazel Ave, Mt Roskill.

**SYMPOOL** (N Z) - SYM user group. John Robertson, PO Box 580, Manurewa, ph 2675-188.11.

**A Z T E C** - Brian Mayo, Chmsh Street, Kaitiaki, Phone 490-326. Members see all minutes.

**BAY MICROCOMPUTER CLUB** (Tairāhiti) - G.L. McKean, Secretary, Snodgrass Road, Tairāhiti, Phone: 25-569.

**BAY OF PLENTY COMMODORE COMPUTER CLUB** - D.J. McVay, of 40 Esk Street, Tairāhiti.

**BEACH COMPUTING CLUB** (Wairāhiti) - Jamie Clarke, Box 132, Wairāhiti, Ph: 45-354. Wairāhiti Beach.

**THE ATARI CONNECTION** - Contact: Paul Corneek, 29 McDermid Cres, Huntly, Ph 111-88-695.

**HAMILTON SUPER 80 USERS'** - Bruce White, 111 436-878.

**WAIKATO COMMODORE USERS' GROUP** - Secretary: Mrs Eileen Woodhouse, 32 Kinnery Crescent, Hamilton.

**WAIKATO COMPUTERS IN EDUCATION SOCIETY** - Secretary: Groll Franks, Pym High School, 72 Elliott Road, Hamilton. Phone 111-81-050.

**WAIKATO SPECTRUM USERS' GROUP** - Secretary: Roger, Loveless, 18 Heath St, Hamilton. Phone 492-080. Meetings: 1st Tuesday of the month.

**MORRISVILLE COMPUTER SOCIETY** - Contact: Alison Smyer, 49 Coronation Road, Morrissville. Phone 6695.11. Meets 1st and 3rd Wednesdays.

**WAIHI COMPUTER ENTHUSIASTS** - Contact: G.C. Jenkins, 10 Smith St, Waihi.11. WAIH 8478. Workshops every Tuesday. Meetings last Tuesday of month.

**GLOWWORM COMPUTER ENTHUSIASTS** - Meets every second Sunday of the month in the Otahanga District Council's board room. Contains: president, Colin Wilkins, Otā 8331; vice president, Hugh Britton, Otā 7228; secretary, Laurence Beven, Otā 7066.

**GISBORNE MICROPROCESSOR USERS' GROUP** - Stuart Mulder-McMann, P.O. Box 486, Gisborne, Phone 88-828.

**ROTORUA COMPUTER CLUB** - Contact: Ken Blackman, 6 Ughart Place, Rotorua. Third Tuesday of each month at 7pm, Wairāhiti Community College, Rotorua.

**ELECTRIC APPLE USERS' GROUP** - Nani Bridgeman, P.O. Box 3105, Fitzroy, New Plymouth, Phone 80-216.

**TARANAKI MICRO COMPUTER SOCIETY** - P.O. Box 7003, Bell Block, New Plymouth. Mr K. Smith. Phone 8556, Waitara.

**HAWKE'S BAY MICROCOMPUTER USERS' GROUP** - Bob Brady, Pymma Pharmacy, Pymma Plaza, Napier, Phone 439-016.

**HASTINGS COMMODORE USERS' GROUP** - Contact: Mike Phillips, 401 Lassent's Street.

**WANGANUI COMMODORE 64 USER GROUP** - Contact: P. Northway, 7 Broadfield Avenue, Wanganui. Meets 1st and 3rd Wednesdays of month at Wanganui Community College.

**HBCE** (Hawke's Bay Computers in Education Society) - Contact - Grant Bennett, 89 King Street, Tairāhiti, Napier, Ph. 446-992.

**MOTOROLA USER GROUP** - Hany Wiggins, 1212BRI, P.O. Box 1718, Palmerston North. Phone 10633 82-527.11.

**HOROWHENUA MICROCOMPUTER CLUB** - Meets on second and 4th Thursday of month. President, Wally Wirtz, P.O. Box 405, Levin; secretary, Dennis Cole, 28 Edinburgh Street, Levin. Ph 10691 83-904.

**WAIKARA MICROCOMPUTER USERS' GROUP** - Geoffrey Potts, 27 Cornwall St, Masterton. Ph 111-87-439.

**CENTRAL DISTRICTS COMPUTERS IN EDUCATION SOCIETY** - Rory Bulin, 4 John Street, Levin 10691 84-456 or Margaret Morgan, 18 Standann Street, Kaitiaki, Wellington. 1041 767-167.

**UPPER HUTT COMPUTER CLUB** - Shano Doyle, 18 Holdsworth Avenue, Upper Hutt. Phone 728-345. An all-male club.

**BBC USER GROUP** - Users of other machines welcome too. See entry head of list.

**MICROBEE USERS' CLUB** - P.O. Box 871, Wellington, 2nd Sunday of month.

**NEC COMPUTER USERS' GROUP** - C. P.O. Box 3820, Wellington.

**N Z SINCLAIR USERS' GROUP** - P.E. McCenoll, 11 Miro Street, Lower Hutt.

**NZ SUPER 80 USERS' GROUP** - C. Pearnt Computers, 5 Dymond Pl., Chantwell, Wellington 4. Phone 791-172.

**OHIO USERS' GROUP** - Wellington. Secretary/Treasurer: R.N. Hislop, 65B Awarua Street, Porirua.

**POLY USERS GROUP** - Wellington. Contact - Christine Greenbank, Computer Studies, Wellington Teachers' College, Private Bag, Kaitiaki, Wellington.

**ATARI USERS' GROUP** - Wellington. Edlin Nankless, Phone 731-024.11. P.O. Box 16011.11. Meetings: 1st Wednesday of month.

**WELLINGTON COMMODORE USERS' GROUP** - P.O. Box 2828, Wellington. Contacts: Peter March 111-888-701, Robert Kinnag 111-789-157.

**WELLINGTON MICROCOMPUTING SOCIETY INC.** - P.O. Box 1581, Wellington, or Bill Peikin 111-725-086. Meetings are held in the Fellowship Room, St Johns Church, 176 Willis Street, on the 2nd Tuesday each month at 7.30pm.

**SEGA OWNERS CLUB** - Lower Hutt. Meets 1st Monday each month. Contact: Murray Tinkett 111-724-356, 111-662-747.

**WELLINGTON SYSTEM 80 USERS' GROUP** - Contact: W.G. Bill Lapsley, day 286-175, evenings 268-938, or Andrew Vincent 780-371.11.11.11.11.

**NELSON COMMODORE USERS' GROUP** - Peter Archer, P.O. Box 860, Nelson, Phone 10541 79-362.11.

**NELSON HOME COMPUTER CLUB** - Contact: Mike Jenkins, Box 571. Ph 87-930. Meets, 7 p.m., 1st and 3rd Tuesdays of 11th month at Nelson Intermediate.

**BLENNHEIM COMPUTER CLUB** - Club night second Wednesday of month, 11am Mynall, Secretary, P.O. Box 668. Phone 111-85-207 or 111-87-834.

**HOKITIKA COMPUTER USERS GROUP** - Contact - Adrian McIntosh, 185 Sowell Street. Ph: 943.

**CANTERBURY COMPUTER EDUCATION SOCIETY** - Contact - Gnanne Sami, secretary, P.O. Box 31 065, Ilam, Christchurch 4.

**CHRISTCHURCH ATARI USERS GROUP** - Contact: Ron van Lindt, 10 Silvanide Place, Christchurch 6, Ph 891-374.

**CHRISTCHURCH TRS 80 COLOUR USER GROUP** - Meetings: last Wednesday of month. Contact: Dennis Rogers, 21 Frankleigh Street, Christchurch 2. Phone 34-731.

**CHRISTCHURCH '80 USERS' GROUP** - Brandon Thompson. Phone 111-370-381. P.O. 4118, Christchurch.

**OSI USERS' GROUP** (CHI) - Barry Long, 377 Barrington St, Sorey, Christchurch. Phone 384-560.11.

**SINCLAIR USERS' GROUP** - CANTERBURY, INC. Contact: Gary Parker (president) Phone 894-820, P.O. Box 4063. Meets 7.30 p.m. 1st Monday of month at Ilam Research Centre, 27 Creyke Road.

**CHRISTCHURCH COMMODORE USERS GROUP** - John Kramer, 885-533 and John Spanow. Phone 896-099.

**CHRISTCHURCH BBC USERS' GROUP** - Contact: Michael Hopkins 111-582-267 or Rodney Derham 111-893-215.

**PANASONIC (JB 3000) USEPS' GROUP** - Contact: Prof B.J. Clarke, Dept of Accounting, University of Canterbury, Private Bag, Christchurch, T.

**CHRISTCHURCH COLOUR GENIE USERS' GROUP** - Meets 2nd Wednesday 7.00pm, Ahrens Shop, Shades Arcade. Secretary, Robert Wilson, 17 Wellington Street, Christchurch, T. Ph: 881-456.

**CHRISTCHURCH SORD MS USERS GROUP** - Meets 1st Thursday of month, 7pm. Ph: 792-771.11.11.11.11.

**DICK SMITH WIZARD COMPUTER CLUB** - Christchurch. Contact: Terry Dodd, 34 Myfield Ave. Ph: 557-327.

**ASHBURNTON COMPUTER SOCIETY** - Mr. J. Clark, 52 Binefield Avenue.

**SOUTH CANTERBURY COMPUTER GROUP** - Caters for all machines from ZX81 to IBM34. Geoff McManhan. Phone Tairāhiti 84-200 or P.O. Box 73.

**NORTH OTAGO COMPUTER CLUB** - Contact: Peter George, P.O. Box 281, Oamaru. Phone 29-106.11.11.11.11.

**LEADING EDGE HOME COMPUTER CLUB** - Elaine Orr, Leading Edge Computers, P.O. Box 2260, Dymond. Phone 55-268.11.11.

**DUNEDIN COMMODORE USER GROUP** - Contact: Mrs S.I. Dowd, C. The Micro Shop, P.O. Box 5518, Dunedin; 111-740-469. Meetings: second Monday of month, 7pm-9pm.

**DUNEDIN SORD USEPS' GROUP** - Terry Shand. Phone 10241 777-295.11.11.11.11.11.

**CENTRAL CITY COMPUTER INTEREST GROUP** - Contact: Terry Stevens, Box 5260, Dymond. Phone 882-603. Meetings every second Tuesday.

**OTAGO COMPUTER EDUCATION SOCIETY** - C. Peter Brook Otago Girls' High School, Dymond.

**ATARI USERS GROUP** - Dymond. Contact - Hawry Kong Tin, Phone 741-509. Meets every second Thursday, netel 10 400-600-800.

**SOUTHLAND COMMODORE USER GROUP** - IVIC 20 and 64st. Address: C. Office Equipment Southland, Box 1079, Invercargill.

**N Z SOFTWARE EXCHANGE ASSOCIATION** - Non-profit group for exchange of software written by programmers members. Contact: Ian Train, Box 333, Tokoroa.

**Note:** Clubs would appreciate a stamped self-addressed envelope with any written reply to them.

If your club or group is not listed, drop a line with the details in: Club Contacts, BITS & BYTES, Box 827, Christchurch. The deadline for additions and alterations is the first weekend of the month before the next issue.

## Legal packages

Paxus Information Services has bought the rights to the software packages for lawyers. The Merrett Legal System, developed in Wellington for IBM PCs will complement the Melbourne-designed Information System for Lawyers, which will run on bigger computers, of the IBM System 34/36/38 range. The Merrett system focuses on the small practice and provides trust accounting, mortgage accounting, accounts rendered-debtors, and a time-cost module.

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# GLOSSARY

**Algorithm:** A list of instructions for carrying out some process step by step.

**Applications program:** A program written to carry out a specific job, for example an accounting or word processing program.

**Array:** A data type found in high level languages, which is stored in a contiguous block of memory. Accessed by the array name and an index making it easier to process groups of data in many situations.

**ASCII:** American Standard Code for Information Interchange. An 8-bit code.

**BASIC:** Beginners' All-purpose Symbolic Instruction Code. The most widely used, and easiest to learn, high level programming language for microcomputers.

**Baud:** Speed of transferring data, measured in bits per second.

**Binary:** The system of counting in 1's and 0's used by all digital computers. The 1's and 0's are represented in the computer by electrical pulses, either on or off.

**Bit:** Binary digit. Each bit represents a character in a binary number, that is either a 1 or 0. The number 2 equals 10 in binary and is two bits.

**Block graphics:** Chunky graphics, built up in small blocks rather than fine points.

**Boot:** To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use. Short for bootstrap.

**Buffer:** An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

**Bug:** An error in a program.

**Bus:** Also called a trunk or highway - a path on which several parts of a computer system may be connected so that signals can be passed between them.

**Byte:** Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".

**CAL:** Computer Aided Learning. CAL programs are written to take different actions on different student answers.

**Card:** In hardware, a circuit board.

**CCIT:** An abbreviation for International Telegraph and Telephone Consulting Committee. A standard maker.

**Chip:** An integrated circuit on a single crystal of semiconductor, far smaller than fingernail size.

**CMOS:** Transistor technology - when a pair of transistors of opposite type are used together. Means low power use.

**Computer language:** Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer.

**Courseware:** Name for computer programs used in teaching applications.

**cpi:** Means character per inch. A common way of describing character density, i.e., how close together characters are in printers.

**CP/M:** An operating system for Z80 based machines. It is by far the most widely used DOS for Z80 based machines and there is an extremely large software base for it. See also disk operating systems.

**cps:** Characters per second. A common way of describing speed in printers.

**Cursor:** A mark on a video that indicates where the next character will be shown, or where a change can next be made.

**Daisywheel printer:** A printer in which the letters are formed by impact of a letter on a disk rotated until the required character is in position.

**Descender:** The "tail" of the letters, g, j, p, q, and y.

**Disk:** A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or floppy disk is a single 8 inch or 5 1/4 inch disk of flexible plastic enclosed in an envelope. A hard disk is an assembly of several disks of hard plastic material, mounted one above another on the same spindle. The hard disk holds up to hundreds of millions of bytes - while floppy disks typically hold between 140,000 and three million bytes.

**Disk drive:** The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.

**Diskette:** Another name for a 5 1/4 inch floppy disk.

**Disk operating system:** A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).

**DOS:** See disk operating system.

**Dot matrix:** A type of print head, made up of a matrix

of pins, e.g. 8x8. When a character is to be printed the appropriate pins push out and strike the ribbon to paper forming the character.

**Dot graphics:** These graphics are individual screen pixels. Used by either turning on or off one pixel.

**Double-density:** Floppy drives that store twice the standard amount of data in the same space.

**Dump:** Popular term for sending data from a computer to a mass storage device such as disks or tape.

**EPROM:** Erasable, user-programmable, read-only memory.

**File:** A continuous collection of characters (or bytes) that the user considers a unit (for example an account's receivable file), stored on a tape or disk for later use.

**Floppies:** Thin plastic disks with a magnetic coating used for storing information. Called floppies because they are flexible.

**Font:** A range of letter within a particular type style.

**Friction feed:** A type of paper-feeding system for printers: normal paper in a continuous sheet is gripped between two friction rollers as on a typewriter.

**Handshaking:** Transferring data across an interface.

**Hardware:** The computer itself and peripheral machines for storing, reading in and printing out information.

**Hex:** Abbreviation for hexadecimal notation, a base-16 numbering system convenient to use with computers.

**High-level language:** Any English-like language, such as BASIC, that provides easier use for untrained programmers.

**IEEE:** A standardisation based on the Institute of Electrical and Electronics Engineers.

**Ink-jet printer:** These printers form images by spraying droplets of ink on to paper. Each droplet is electrically charged and is deflected into the required position by magnetic plates.

**Input:** Any kind of information that one enters into a computer.

**Interactive:** Refers to the "conversation" or communication between a computer and the operator.

**Interface:** Any hardware/software system that links a microcomputer and any other device.

**I/O:** "Input/output".

**Inverse video:** When the background is coloured; e.g. on a black and white screen while becomes background and characters are written in black.

**Justified:** Printing is justified when the lines are flush on the left and right sides.

**K:** The number 1024. Commonly refers to 1024 bytes. Main exception is capacity of individual chips, where K means 1024 bits.

**Kilobyte (or K):** Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024).

**LCD:** Liquid-crystal display.

**Line feed:** A control code character found in the ASCII character set. Its normal purpose is to move the cursor down one line (on screen) or move paper up one line (on printer). Does not return the cursor to the left-hand margin.

**Lower case:** Non-capital alphabetical letters.

**Machine language:** The binary code language that a computer can directly "understand".

**Mainframe:** The very large computers that banks and other large businesses use are called mainframes. Also in microcomputers the term is sometimes used to describe the core of the machine, i.e. the CPU plus memory.

**Mass storage:** A place in which large amounts of information are stored, such as a cassette tape or floppy disk.

**Megabyte (or Mb):** Represents a million bytes.

**Memory:** The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory.

**Memory capacity:** Amount of available storage space, in Kbytes.

**Menu:** List of options within a program that allows the operator to choose which part to interact with (see Interactive). The options are displayed on a screen and the operator chooses one.

**Microcomputer:** A small computer based on a microprocessor.

**Microprocessor:** The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.

**Minicomputer:** Originally a computer that went with a single equipment cabinet. Now a computer between a microcomputer and a mainframe. Note that the boundaries between mini's and the classes on either side of it are unclear.

**Modem:** Modulator-demodulator. An instrument that connects a microcomputer to a telephone and

allows it to communicate with another computer over the telephone lines.

**Mother board:** A large circuit board that has other boards attached to it.

**Network:** An interconnected group of computers or terminals linked together for specific communications.

**Output:** The information a computer displays, prints or transmits after it has processed the input. See input and I/O.

**Parallel interface:** A type of communications interface used mostly for printers. It sends a whole character of data down eight (commonly) lines, one bit down each line. The most common type of parallel interface for printers is the Centronics interface.

**Pascal:** A high-level language that may eventually rival BASIC in popularity. It incorporates the form of structured programmes.

**PEEK:** A command that examines a specific memory location and gives the operator the value there.

**Peripherals:** All external input or output devices: printer, terminal, drives etc.

**Pixel:** Picture element. The point on a screen in graphics.

**Plotter:** An output device for translating information from a computer into pictorial or graphical form on paper or a similar medium.

**POKE:** A command that inserts a value into a specific memory location.

**Program:** A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.

**RAM:** Random access memory is the very fast memory inside your computer. The access time for any piece is the same. Your program and run-time data are usually stored in RAM.

**REM statement:** A remark statement in BASIC. It serves as a memo to programmers, and plays no part in the running program.

**Resolution:** A measure of the number of points (pixels) on a computer screen.

**ROM:** Read only memory. Any memory in which information or instructions have been permanently fixed.

**Serial interface:** A type of communications interface used for a wide variety of purposes (printers, terminals, telephone correction etc.). It uses a minimum of two wires, and sends the data one bit at a time down one wire. The most common type of serial interface is RS232C.

**Sheet feed:** A type of paper feeding system normally used for high-quality document printers. A special device picks up a sheet of paper and feeds it into friction rollers.

**Software:** Any programs used to operate a computer.

**Spike:** A disturbance in the power supply - an unwanted pulse of short duration.

**SP:** Second processor.

**Sprocket feed:** See pin feed.

**System:** A collection of hardware and software where the whole is greater than the sum of the parts.

**Tractor feed:** A type of paper feeding system for printers. Special computer paper with holes along both sides is led by the tractors gripping these holes.

**Word:** A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.

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## SPECTRUM 16K

### Heathrow

### Hewson Consultants

The world's busiest airport, and YOU are the air traffic controller. Just like real life: different aircraft on different approach paths and at different speeds... realistic radar... holding patterns... stock displays—and if you get it wrong, something overshoots! Very tough to master. \$34.95 elsewhere

SOFTSHOP PRICE \$19.95



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## SPECTRUM 16K

### Apple Jam

DK Tronics

The ZANIEST game of the year! Fat as much jam and as many apples as you can, but don't get too fat or you'll have to visit the sauna and while you're in there the tiny rat will grow big and bold on your uneaten fruit and BITE YOU DEAD! So maybe you'd better jump in the lift and if your timing's right you can land it on the rat and squash him and watch the blood (ugh!) ooze down the side and is THIS why Apple Jam is a best-selling game in France? \$24.95 value, but you deserve a treat.

SOFTSHOP PRICE \$9.95

## SPECTRUM 16K

### 3D Space Wars

Hewson Consultants

Stunning 3D space simulation game, the first of three in a series. Features deep space radar scan, digital scoring, fuel and speed displays, enemy kill and fleet count displays. Ever-increasing difficulty, and amazing colour graphics. \$24.95 value

SOFTSHOP PRICE \$19.95

## SPECTRUM 16K

### Rood Tood

DK Tronics

A must for everyone's collection is this version of the arcade favourite. Guide Toady on his hectic journey to the lily pads, dodging gigantic juggernauts, hissing snakes, rolling logs and diving turtles. You COULD pay \$39.95 for a Froggie game—we suggest you don't!

SOFTSHOP PRICE \$9.95

## SPECTRUM 16K

### Hord Cheese

DK Tronics

Steel Farmer Giles around the paddocks in his "ferkinator" collecting looaze and cheese. But watch out for the vicious craphoppers (though you can dispatch these with giant Coxes). And don't dose YOURSELF with that aggrocider! \$19.95 value

SOFTSHOP PRICE \$9.95

## SPECTRUM 16K

### Gold Mine

DK Tronics

What will your frantic tunnelling bring you? Hard rock? Floodwater? Rockfalls? Death by drowning? Death by exhaustion? Or... GOLD? Nice game of skill and strategy, with sound and animated graphics. \$19.95 value.

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## COMMODORE 64

### Troopo Truck

Rabbit Software

Great graphics—and great fun! Marooned on a hostile planet, you must guide your bouncing, leaping multi-terrain wagon over craters, through boulders and over landmines. Survive that lot, and all you've to worry about are the deadly hovering Helichaigas... and the Lase Slammer tanks... and the Naizon Heatseekers and... Ugh! \$24.95 value

SOFTSHOP PRICE \$19.95

## SPECTRUM 48K

### Tutonkhamun

Micromania

Fourteen tombs, each three screens wide—that's 42 screenfuls of gripping arcade action! There's treasure in plenty in Tutonkhamun's tomb—but beware the monsters who also lurk there. And don't pick up the wrong "door" key, or your exit might be permanent! Ber you can't reach the eleventh tomb! \$24.95 value

SOFTSHOP PRICE \$19.95

## COMMODORE 64

### Millie Bug

DK Tronics

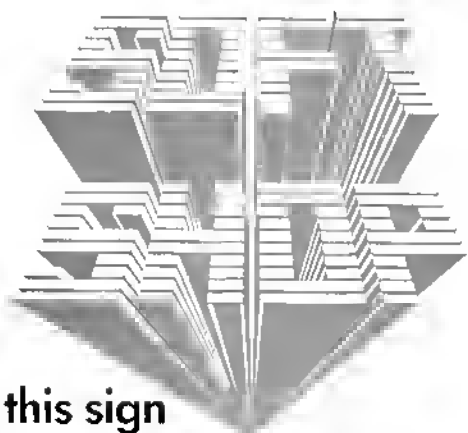
Great interpretation of one of arcade-land's all-time favourites. Nine skill levels, from Centri-stroll to Centri-frantic (don't blink, or you'll lose TWO lives!) A \$24.95 game if ever we saw one, but...

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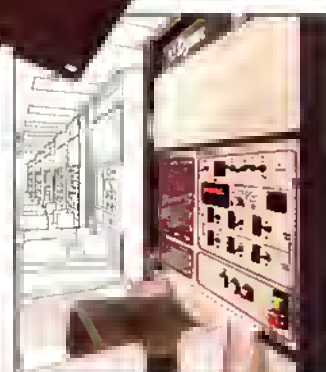
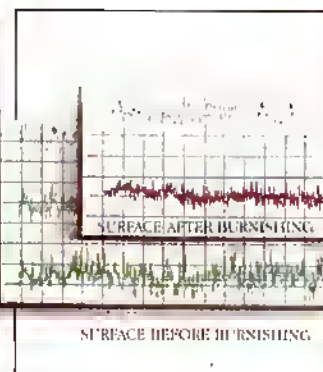
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